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A STUDY OF DUST SUPPRESSANTS IN ONTARIO

VOLUME 3

AUGUST 1993

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A STUDY OF DUST SUPPRESSANTS IN ONTARIO

Volume 3

Report prepared for:

The Ontario Ministry of the Environment and Energy
Waste Management Branch

by

CH2M HILL ENGINEERING LTD.
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L5N 1V9

August 1993

TABLE OF CONTENTS

Appendix

F. PRODUCT APPLICATION SHEETS

F.1 Calcium Chloride
F.2 Oil Field Brine
F.3 Tembind
F.4 Road Binder
F.5 DCS-225
F.6 Dust Bond
F.7 Line Wash Oil
F.8 Coke Wash Oil
F.9 Bunker Fuel Oil
F.10 Rerefined Oil

APPENDIX F.1

Calcium Chloride

PRODUCT APPLICATION SHEET FOR CALCIUM CHLORIDE

A. GENERAL INFORMATION

DESCRIPTION

Two calcium chloride products are used for dust suppression. These are:

- Liquid calcium chloride.
- Flake/powdered calcium chloride.

Calcium chloride in both forms can be applied to surfaces for dust suppression. Liquid calcium chloride is a colourless, clear to slightly turbid water solution without odour. It can be produced in a solution of 20 to 45 percent calcium chloride ($CaCl_2$). The Ontario Ministry of Transportation requires that calcium chloride solutions to be used for dust suppression contain a minimum of 35 percent (mass) calcium chloride at 15 °C (Ontario Provincial Standard Specification 2501-1, December, 1983).

Flake/powdered calcium chloride is in the form of small, white, odourless flakes that are deliquescent (i.e. will dissolve in moisture absorbed from the atmosphere).

MANUFACTURER AND SUPPLIER INFORMATION

General Chemical Canada Ltd.
201 City Centre Drive
Mississauga, Ontario
L3B 3A3

Telephone: (416) 566-2909
Contact: Mr. Carl Bauslaugh

Calcium chloride is manufactured and distributed by General Chemical.

APPLICATOR/CONTRACTOR INFORMATION

General Chemical can provide information on contractors and applicators. Mr. Jim Baxter in Mississauga at (416) 898-9595 is suggested as a contact.

B. HANDLING PROCEDURES

The following safety procedures for the handling of liquid and flake calcium chloride are recommended by General Chemical.

PERSONAL PROTECTION

1. Operators should wear chemical safety goggles and a hard hat when handling dry flake or solutions of calcium chloride with a reasonable chance of eye contact (such as when manually filling tanks). In addition, under these conditions contact lenses should not be worn.

2. Operators should wear a long sleeved shirt, trousers, impervious boots, gloves, and apron under normal operating conditions and if there is a chance of contact with solution. Cotton gloves are permitted for flake product.

3. Operators should wear NIOSH[1]-approved mist-respirator (these should not contain metals corrodible by calcium chloride solution) for dusty or misty conditions.

EMERGENCY FIRST AID

First aid procedures are listed in the attached MSDS.

TRANSPORTATION AND SHIPPING REQUIREMENTS

Flake calcium chloride may be shipped from the manufacturer in bags, tonne sacks, and bulk via rail or trailer transport. Bulk transportation should be covered to prevent loss of product.

Liquid calcium chloride is sold in bulk by General Chemical and is transported via tanker truck, rail, or ship.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing

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1 National Institute for Occupational Safety and Health

unit beyond the recommended maximum application rate into the natural environment. This can be caused by spray bars left on after operation, tank rupture, tank turnover, etc. In the event of a spill the following procedures are recommended:

1. The spill should be isolated and contained as best possible.

2. The regional office of General Chemical and General Chemical Manufacturing at (519) 736-2111 in Sarnia should be notified after the spill has been contained.

3. All Provincial and Federal Agencies as required by law are to be notified immediately. Operators should call:

   - The Ontario Spills Action Centre at 1-800-268-6060.
   - The municipality in which the spill occurred.
   - Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular).

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants, dust suppressants should not be applied to sites closely adjacent to or crossing waterway(s) or marshes, or near wells.

SURFACE PREPARATION AND APPLICATION PROCEDURES

A general methodology for the application of calcium chloride in both the liquid and flake form, based on a compilation of literature provided by General Chemical, is presented below:

1. Proper drainage should be provided for the yard, or on both sides of the road.

2. The surface should be graded to a significant depth (20 to 50 mm) to remove pot holes, corrugations and other ruts. If the road is deeply rutted or corrugated it may require scarification between 25 and 100 mm.

3. Gravel or fines should be added as required, to yield a final composition of 10 to 15 percent fines (< 200 mesh).

4. The road should be shaped to the correct crown (about 4% straight line) using a grader equipped with a straight flat blade.

5. If flake calcium chloride is being applied, the surface should first be sufficiently moistened with water so that when the soil is squeezed with the hand and let go it does not separate. This is especially important during dry periods.

6. The calcium chloride (liquid or flake) should be applied at desired levels while the surface is still moist.

7. The surface may be modestly moistened after application of flake product.

8. If the road or surface is being constructed, compaction of the surface is suggested to provide a firm solid base.

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Application of calcium chloride should be made while the road surface is still moist/ damp. Usually, this is about 6 to 12 hours after a significant rainfall, depending on the time of year. Application should be made 12 to 24 hours before the next rainfall, depending on humidity, to permit curing and hardening of the surface, and to prevent leaching and runoff.

APPLICATION EQUIPMENT

Application equipment guidelines for provincial transportation agencies vary significantly. The most comprehensive guidelines for equipment for application of liquid calcium chloride are:

- Truck tanker size should not be less than 18,000 litres for liquid calcium chloride delivery, unless limited by narrow or steep roads.

- A pressurized distributor for application of liquid products with at least the following equipment:
  - a quick opening gate in the dome
  - a dipstick calibrated in 10 mm increments with calibration chart
  - an external readily visible depth gauge with 50 litre accuracy.

- Rear mounted spray bars and nozzles 0.6 to 3.6 m wide capable of:
  - vertical and lateral adjustment
  - producing double coverage in one pass.

- Spray bars that do not extend into the lane of opposing traffic unless adequate warning measures are taken

- The feed to the spray bars equipped with:
  - recirculation before and during operation
  - filters.

- Spray nozzles:
  - fitted with instant on/off valves, and,
  - which yield fan-shaped sprays without atomization

- A pressure pump capable of applying a minimum of 120 litres of material per minute per meter spray bar.

- An operator visible 15 kPa pressure gauge.

- An operator visible flow meter.

- An operator visible fifth wheel tachometer calibrated in meters per minute.

Flake calcium chloride can be distributed by a spreader of any type that will ensure uniform application in controlled strip widths and application rates. A tachometer or rate control system as described above is considered necessary equipment. This should be applied on a moist surface immediately after balding.

PERSONNEL REQUIREMENTS

Typically, two to four people are required for safe application of dust suppressant. This would consist of at least one, maybe two, flag persons and/or operator of a pilot warning vehicle, the application truck operator, and a checker (the flag person can double as this person).

DILUTION

Liquid calcium chloride is not normally diluted. Flake calcium chloride can be mixed with water to form a liquid solution, if desired. The water should be clear with no visible suspended particles.

Calcium chloride can be mixed with sodium chloride, but this will have a slightly negative effect on the performance as a dust suppressant. Calcium chloride should not be mixed with any other liquids, particularly bromine trifluoride, or a mixture of boron trioxide and calcium oxide, since a violent reaction with result.

APPLICATION RATE AND FREQUENCY

In most municipalities across Ontario, calcium chloride is applied at least once and usually twice per season. Drier seasons may warrant three applications of the product. Applications rates vary from 0.5 to 5.0 L/m^2 of 35 percent calcium chloride depending on carryover of the previous years product, climatic conditions, and surface conditions/compositions.

The first application rates in the season may range from as low as 0.5 L/m^2 to as much as 1.3 L/m^2. For non-industrial road treatment, subsequent application is in late summer/early fall and is generally suggested to be two thirds of the initial value.

Studies have shown that mixed in applications of calcium chloride will remain effective for longer periods of time than topical applications in wetter weather because of a greater ability to resist leaching. However, topical applications are more effective in dry weather.

Typical application rates for flake calcium chloride are from 1.0 to 3.8 tonnes/km, or from 0.44 kg/m^2 to 0.8 kg/m^2 for the first application. Subsequent applications are also suggested to be about two thirds of the initial value. Industrial applications will be as needed.

British Columbia's Ministry of Transportation and Highway Maintenance suggest the following application rates:

	35 Percent Liquid Calcium Chloride	Flake Calcium Chloride
Roads Never Before Treated	1.65 L/m^2	1.00 kg/m^2
Option 1: Previously Treated Roads		
First application of any year.	1.00 L/m^2	0.60 kg/m^2
Further annual application (same year).	0.50 L/m^2	0.30 kg/m^2
Option 2: Previously Treated Roads		
Single annual application only.	1.25 L/m^2	0.75 kg/m^2

Ponding should be avoided during application. It is important to note that ponding can occur at or below the maximum application rates. Ponding will depend on several factors: the rate of liquid calcium chloride discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of

the road. Care should also be taken to ensure that the liquid is applied at or below the suggested rates. If ponding still occurs then a decrease in the application rate is necessary.

CURING TIME

Traffic may be allowed onto the road immediately after calcium chloride application. Curing time (12 to 24 hours) depends on relative humidity and ambient temperature after application.

PROBLEMS/HAZARDS

Roads treated with calcium chloride may be slippery after a period of rain.

General Chemical

Product Safety Data Sheet

LIQUID CALCIUM CHLORIDE

A. PRODUCT INFORMATION

TRADE NAME (PRODUCT IDENTIFIER):
LIQUID CALCIUM CHLORIDE

CHEMICAL NAME AND/OR SYNONYM:
Calcium Chloride Solution

FORMULA: 20–45% $CaCl_2$ Solution

CAS NO:
10043-52-4 (anhydrous)

PRODUCT USE:
Deicer, dust control, mud drilling lubricant, freeze-proofing of ores and aggregates, thawing agent, concrete conditioner.

MANUFACTURER/IMPORTER:

General Chemical Canada Ltd
201 City Centre Drive
Mississauga, Ontario L5B 3A3

SUPPLIER/DISTRIBUTOR:

General Chemical Canada Ltd.
201 City Centre Drive
Mississauga, Ontario L5B 3A3

EMERGENCY TELEPHONE NO: (519) 736-2111

B. PREPARATION INFORMATION

PREPARED BY: General Chemical Canada Ltd.
Industrial Hygiene Department
Telephone: (519) 736-2111

DATE PREPARED: May 1988

DATE REVISED: March 1991

C. TOXICOLOGICAL PROPERTIES

INHALATION:
Mist inhalation may irritate nose, throat and lungs. May cause nose bleeds.

INGESTION:
Low in toxicity. May irritate gastrointestinal tract and cause nausea and vomiting.

SKIN:
May cause skin irritation. Under conditions of prolonged contact, superficial burns may result. Contact with abraded or broken skin can cause severe necrosis.

EYES:
May irritate or burn eyes.

ACUTE TOXICITY:
Moderately toxic LD_{50} (orl-rat) 1000 mg/kg
Anhydrous basis.

CHRONIC TOXICITY:
Not applicable

EXPOSURE LIMITS:
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold limit value - Time Weighted Average (TLV-TWA) guideline for nuisance particulate (liquified mist) 10 mg/m^3

OTHER:

BIOLOGICAL EXPOSURE INDICES (BEI.):
Not applicable

D. PHYSICAL DATA

MATERIAL IS AT NORMAL CONDITIONS:	APPEARANCE AND COLOR:	ODOR THRESHOLD:
LIQUID [x] SOLID [ ] GAS [ ] [ ] _____	Clear to slightly turbid liquid	Odorless
BOILING POINT: 116 °C **FREEZING POINT:** -7 °C (MELTING POINT)	**SPECIFIC GRAVITY:** g/cc (H_2O = 1) 20% $CaCl_2$ 1.19 @ 27°C 34% $CaCl_2$ 1.34 45% $CaCl_2$ 1.47	**VAPOR DENSITY:** (AIR = 1) Not applicable
SOLUBILITY IN WATER: Complete	**pH** Neutral to slightly Alkaline	**VAPOR PRESSURE:** (mm Hg @ 20°C) 1.1 kPa 35% (PSIG) 35% $CaCl_2$
EVAPORATION RATE: (Ether = 1.0) Not applicable Slow <0.3 Fast >3.0 Medium 0.3 - 3.0	**% VOLATILES BY VOLUME:** (AT 20°C) Not applicable	MOLECULAR WEIGHT: 110.99 as annydrous $CaCl_2$ **COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not Available

E. REACTIVITY DATA

STABILITY:	CONDITIONS TO AVOID:
UNSTABLE [ ] STABLE [x]	Not applicable

INCOMPATIBILITY (MATERIALS TO AVOID):
Reacts violently with bromine trifluoride (BrF_3), or a mixture of boron trioxide and calcium oxide (B_2O_3 + CaO). Water-reactive materials, such as sodium: causes an exothermic reaction. Methyl vinyl ether: starts runaway polymerization reaction. Zinc as in galvanized iron: yields hydrogen gas, which may explode under these conditions.

HAZARDOUS DECOMPOSITION PRODUCTS:
Fumes of Chlorides (Cl^-) are given off at temperatures above 1600°C.

HAZARDOUS POLYMERIZATION:	OTHER PRECAUTIONS:
WILL NOT OCCUR [x] MAY OCCUR [ ]	Will undergo violent polymerization with methyl vinyl ether. The anhydrous, monohydrate, dihydrate and tetrahydrate forms of calcium chloride, when dissolved in water, produce considerable amounts of heat.

F. FIRE OR EXPLOSION HAZARD

CONDITIONS OF FLAMMABILITY:	FLASH POINT: °C
Not applicable	METHOD Not applicable
HAZARDOUS COMBUSTION PRODUCTS: None	

% BY VOL IN AIR	EXPLOSION HAZARDS:
UPPER FLAMMABLE LIMIT: Not applicable LOWER FLAMMABLE LIMIT: Not applicable AUTO IGNITION TEMPERATURE: °C	See Section E, Incompatibility.

SENSITIVITY TO MECHANICAL IMPACT:
Not applicable

SENSITIVITY TO STATIC DISCHARGE:
Not applicable

FIRE EXTINGUISHING PROCEDURES:
Use extinguishing media appropriate for surrounding fire. For fire fighting wear NIOSH-approved self-contained breathing apparatus

G. HAZARDOUS INGREDIENTS (MIXTURES ONLY)

MATERIAL OR COMPONENT/C.A.S. #	CONCENTRATION	HAZARD DATA
Not applicable		

H. PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT:

RESPIRATORY PROTECTION:

For misty conditions, wear NIOSH-approved mist respirator.
Respirator should not contain any metals corrogible by these solutions.

EYES AND FACE:

For misty conditions, or when handling solutions where there is reasonable probability of eye contact, wear chemical safety goggles and hard hat. Under these conditions, do not wear contact lenses.

HANDS, ARMS, AND BODY:

As a minimum, wear long-sleeve shirt and trousers, impervious boots, gloves and apron, for routine product use.

STORAGE:

Keep container closed. Protect from physical damage. Do not store in metals which this solution corrodes. See Section E.

NORMAL HANDLING:

Avoid contact with eyes, skin or clothing. Avoid breathing mist. Use good personal hygiene and housekeeping.

ENGINEERING CONTROLS:

Ventilation: Provide general and/or local exhaust ventilation to maintain mist or vapour levels below exposure limits.
Eye wash facility should be provided in storage and general work area.

ENVIRONMENTAL:

DEGRADABILITY:

Not applicable

AQUATIC TOXICITY:

Harmful to aquatic life at concentrations greater than 500 ppm. $CaCl_2$ does not bioaccumulate. TL_m 96>1000 mg/1.

SPILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT):

Dilute small spills cautiously with plenty of water. Mop into metal drum and cover. (Many metals are slowly corroded by these solutions.) Cautiously spray residue with plenty of water. Large spills: dike up with any available absorbent (commercial, sand, etc.). Pump into same containers, and treat as above.

WASTE DISPOSAL:

Consistent with the requirements of local waste disposal authorities.

Not applicable		

I. FIRST AID MEASURES

INHALATION:

Promptly remove to fresh air. Get medical attention if any discomfort from inhalation.

INGESTION:

If conscious, immediately give 2 to 4 glasses of water, and induce vomiting by touching finger to back of throat. Get medical attention promptly.

SKIN:

Remove contaminated clothing. Wash with plenty of soap and running water.

EYES:

Flush eyes promptly with plenty of running water, continuing for at least 15 minutes. Get medical attention.

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General Chemical

Product Safety Data Sheet

FLAKE CALCIUM CHLORIDE

A. PRODUCT INFORMATION

TRADE NAME (PRODUCT IDENTIFIER):

FLAKE CALCIUM CHLORIDE
POWDERED CALCIUM CHLORIDE

CHEMICAL NAME AND/OR SYNONYM:
Calcium Chloride, Dihydrate

FORMULA:
$CaCl_2 . 2 H_2O$

CAS NO:
10035-04-8

PRODUCT USE:

Deicer, dust control, mud drilling lubricant, freeze-proofing of ores and aggregates, thawing agent, concrete conditioner.

MANUFACTURER/IMPORTER:

General Chemical Canada Ltd
201 City Centre Drive
Mississauga, Ontario L5B 3A3

SUPPLIER/DISTRIBUTOR:

General Chemical Canada Ltd
201 City Centre Drive
Mississauga, Ontario L5B 3A3

EMERGENCY TELEPHONE NO: (519) 736-2111

B. PREPARATION INFORMATION

PREPARED BY: General Chemical Canada Ltd.
Industrial Hygiene Department
Telephone. (519) 736-2111

DATE PREPARED: May 1988

DATE REVISED: March 1991

C. TOXICOLOGICAL PROPERTIES

INHALATION:

Dust or mist inhalation may irritate nose, throat and lungs.

INGESTION:

Low in toxicity. May irritate gastrointestinal tract and cause nausea and vomiting.

SKIN:

May cause skin irritation. Prolonged contact when moisture is present may result in superficial burns. Contact with abraded skin or cuts can cause severe necrosis.

EYES:

May irritate or burn eyes.

ACUTE TOXICITY:

Moderately toxic LD_{50} (ori-rat): 1000 mg/kg

EXPOSURE LIMITS:

Ontario Ministry of Labour Time-Weighted Average Exposure Value (TWAEV) for Nuisance Particulate 10 mg/m^3.

CHRONIC TOXICITY:

Not applicable

OTHER:

BIOLOGICAL EXPOSURE INDICES (BEI.):

Not applicable

MATERIAL IS AT NORMAL CONDITIONS:	APPEARANCE AND COLOR:	ODOR THRESHOLD:
LIQUID [ ] SOLID [x] GAS [ ] [ ] _____	Small White Flakes Very hygroscopic	Odorless
BOILING POINT: Not Available (Denydration) **FREEZING POINT:** **(MELTING POINT)** 176 °C	**SPECIFIC GRAVITY:** g/cc (H_2O = 1) Not available	**VAPOR DENSITY:** (AIR = 1) Not applicable
SOLUBILITY IN WATER: 97.7 g/100 ml @ 0°C 326 g/100 ml @ 60°C	**pH** Neutral to slightly Alkaline	**VAPOR PRESSURE:** (mm Hg @ 20°C) Not applicable (PSIG)
EVAPORATION RATE: (Ether = 1.0) Not applicable Slow <0.3 Fast >3.0 Medium 0.3 - 3.0	**% VOLATILES BY VOLUME:** (AT 20°C) Not applicable	**MOLECULAR WEIGHT:** 147.02 **COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not Available

E. REACTIVITY DATA

STABILITY:	CONDITIONS TO AVOID:
UNSTABLE [ ] STABLE [x]	Not applicable

INCOMPATIBILITY (MATERIALS TO AVOID):
Reacts violently with bromine trifluoride (BrF_3), or a mixture of boron trioxide and calcium oxide (B_2O_3 + CaO). Sulfuric acid: yields hydrogen chloride gas, which is corrosive, irritating, and reactive. Water-reactive materials, such as sodium: causes an exothermic reaction. Methyl vinyl ether: starts runaway polymerization reaction. Zinc as in galvanized iron: yields hydrogen gas with solutions, which may explode under these conditions.

HAZARDOUS DECOMPOSITION PRODUCTS:
Fumes of Chlorides (Cl^-) are given off at temperatures above 1600°C.

HAZARDOUS POLYMERIZATION:	OTHER PRECAUTIONS:
WILL NOT OCCUR [x] MAY OCCUR [ ]	Will undergo violent polymerization with methyl vinyl ether. The anhydrous, monohydrate, dihydrate and tetrahydrate forms of calcium chloride, when dissolved in water, produce considerable amounts of heat.

F. FIRE OR EXPLOSION HAZARD

CONDITIONS OF FLAMMABILITY:	FLASH POINT: °C
Not applicable	METHOD Not applicable
HAZARDOUS COMBUSTION PRODUCTS: None	

% BY VOL. IN AIR	EXPLOSION HAZARDS:
UPPER FLAMMABLE LIMIT: LOWER FLAMMABLE LIMIT: Not applicable AUTO IGNITION TEMPERATURE: °C	See Section E Incompatibility

SENSITIVITY TO MECHANICAL IMPACT:
Not applicable

SENSITIVITY TO STATIC DISCHARGE:
Not applicable

FIRE EXTINGUISHING PROCEDURES:
Use extinguishing media appropriate for surrounding fire. For fire fighting wear NIOSH approved self contained breathing apparatus.

G. HAZARDOUS INGREDIENTS (MIXTURES ONLY)

MATERIAL OR COMPONENT/C.A.S. #	CONCENTRATION	HAZARD DATA
Not applicable		

H. PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT:

RESPIRATORY PROTECTION:

For dusty or misty conditions, wear NIOSH-approved dust or mist respirator.

EYES AND FACE:

For dusty or misty conditions, or when handling solutions where there is reasonable probability of eye contact, wear chemical safety goggles and hard hat. Under these conditions do not wear contact lenses.

HANDS, ARMS, AND BODY:

As a minimum, wear long-sleeve shirt, trousers, rubber boots and gloves for routine product use. Cotton gloves permitted for dry product, impervious gloves when using solutions.

STORAGE:

Cool, dry area. Prolonged storage may cause product to cake and become wet from atmospheric moisture.

NORMAL HANDLING:

Avoid contact with eyes, skin or clothing. Avoid breathing dust. Use good personal hygiene and housekeeping.

ENGINEERING CONTROLS:

Ventilation: Provide general and/or local exhaust ventilation to maintain dust or fume levels below exposure limits.
Eye wash facility should be provided in storage and general work area.

ENVIRONMENTAL:

DEGRADABILITY:

Not applicable

AQUATIC TOXICITY:

Harmful to aquatic life at concentrations greater than 500 ppm. $CaCl_2$ does not bioaccumulate. TL_m 96>1000 mg/1.

SPILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT):

Shovel up dry chemical and place in metal drum with cover. Cautiously spray residue with plenty of water. Keep contaminated water from entering sewers and water courses.

WASTE DISPOSAL:

Consistent with the requirements of local waste disposal authorities.

TDGA CLASS:	PIN:	LABEL:
Not applicable	Not applicable	Not applicable

I. FIRST AID MEASURES

INHALATION:

Promptly remove to fresh air.

INGESTION:

If conscious, immediately give 2 to 4 glasses of water, and induce vomiting by touching finger to back of throat. Get medical attention for irritation, ingestion, or discomfort from inhalation.

SKIN:

Remove contaminated clothing. Wash with plenty of soap and running water.

EYES:

Flush eyes promptly with plenty of running water, continuing at least 15 minutes. Get medical attention.

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APPENDIX F.2

Oil Field Brine

PRODUCT APPLICATION SHEET FOR OIL FIELD BRINE

A. GENERAL INFORMATION

DESCRIPTION

Oil field brine, also referred to as formation water, is a clear to slightly turbid water without odour, that is with drawn from wells during oil drilling operations. It usually contains salts in solution (calcium, magnesium, and sodium chloride, at average concentrations of 12, 4 and 9 percent respectively) as well as other dissolved minerals associated with the region of extraction. It is usually applied for dust suppression in south western Ontario, as it is generated by the petroleum industry in that region. Other uses for oil field brine are as tire ballast, winter ice control, and well killing (to prevent gas from exiting).

MANUFACTURER

Oil field brine is not generated in the Province of Ontario for the purpose of road dust suppression. It is a liquid associated with the production of crude oil and natural gas. The liquid must be disposed of by either pumping it back into the ground with Ministry of Natural Resources approval, or by removal from the well sites by contractors/applicators.

SUPPLIER INFORMATION

Several companies involved in oil drilling operations supply the oil field brine to the applicators. The Ontario Petroleum Institute can be contacted for information on potential suppliers of oil field brine.

APPLICATORS/CONTRACTORS

There are two major contractors in Ontario who store and apply oil field brine for dust suppression. These are:

Harold Marcus Ltd.
R.R. #3
Bothwell, Ontario
N0P 1C0

Telephone: (519) 695-3734
Contact: Dennis Marcus

McKeegan Trucking Ltd.
R.R. #1
Sombra, Ontario
N0P 2H0

Telephone: (519) 864-1782
Contact: Bruce McKeegan

B. HANDLING PROCEDURES

PERSONAL PROTECTION

The following steps from the attached oil field brine Material Safety Data Sheet help to ensure the protection of applicators:

1. Applicators should avoid all eye and skin contact with oil field brine.

2. Applicators should wear long sleeve shirts, trousers, impervious boots, gloves and apron if there is a chance of contact with oil field brine.

3. Applicators should wear NIOSH[1]-approved mist respirators for misty conditions. The masks should not contain metals corrodible by oil field brine.

4. Applicators should wear chemical safety goggles when handling oil field brine with a reasonable chance of eye contact (such as when manually filling tanks).

EMERGENCY FIRST AID

First aid procedures are outlined in the attached Material Safety Data Sheet for oil field brine.

TRANSPORTATION AND SHIPPING REQUIREMENTS

Oil field brine is transported via tanker truck. No special handling requirements are necessary.

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1 National Institute for Occupational Safety and Health.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application rate, into the natural environment. This can be caused by spray bars left on after operation, tank rupture, tank turn over, etc. In the event of a spill the following procedures are recommended:

1. The spill should be isolated and contained as best possible.

2. All Provincial and Federal Agencies as required by law are to be notified immediately including:

    - The Ontario Ministry of the Environment Spills Action Centre at (800) 268-6060.
    - The municipality in which the spill occurred.
    - Environment Canada at The Ontario Regional Environmental Emergencies line: (416) 973-1059, or (416) 346-1971 (cellular).

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants, product dust suppressants should not be applied to sites closely adjacent to or crossing waterway(s) or marshes, or near wells.

SURFACE PREPARATION

The suggested preparation for oil field brine application, is as follows:

1. Proper drainage should be provided for the yard or on both sides of the road.

2. The surface should be graded to a significant depth (20 to 50 mm) to remove pot holes, corrugations and other ruts. If the road is deeply rutted or corrugated it may require scarification between 25 and 100 mm.

3. Gravel or fines should be added as required to yield a final composition of 10 to 15 percent fines (<200 mesh).

4. The road must be shaped to the correct crown (about 4% straight line) using a grader equipped with a straight flat blade.

5. Oil field brine should be applied while the surface is still moist.

6. Compaction of the surface is suggested to provide a firm solid base, particulary if the surface is being constructed.

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Application of oil field brine is generally made while the road surface is moist/damp. Usually, this is about 6 to 12 hours after a significant rainfall, depending on the time of year. Application should be made 12 to 24 hours before the next rainfall, depending on humidity, to permit curing and hardening of the surface. If heavy rains are expected, the brine should not be applied until afterwards to prevent leaching and runoff.

APPLICATION EQUIPMENT

The most comprehensive guidelines for application equipment are presented below:

- A pressurized distributor tanker truck of no less than 18,000 litres capacity, unless limited by narrow or steep roads.

- A quick opening gate in the dome.

- A dipstick calibrated in 10 mm increments with calibration chart.

- An external readily visible depth gauge with 50 litre accuracy.

- Rear mounted spray bars and nozzles 0.6 to 3.6 m wide capable of:
  - vertical and lateral adjustment
  - producing double coverage in one pass.

- Spray bars that do not extend into the lane of opposing traffic unless adequate warning measures are taken.

- The feed to the spray bars equipped with:
  - recirculation before and during operation
  - filters.

- Spray nozzles:
  - fitted with instant on/off valves, and,
  - which yield fan-shaped sprays without atomization.

- A pressure pump capable of applying a minimum of 120 litres of material per minute per meter spray bar.

- An operator visible 15 kPa pressure gauge.
- An operator visible flow meter.
- An operator visible fifth wheel tachometer calibrated in meters per minute.

PERSONNEL REQUIREMENTS

Typically, two to four people are required for safe application. This would consist of at least one, maybe two, flag persons and or operator of a pilot warning vehicle, the operator of the application truck, and a checker (the flag person can double as the checker).

DILUTION

Oil field brine is not usually diluted as effectiveness is reduced. It could be diluted with water, but should not be mixed with any other liquid without Ministry of the Environment review.

APPLICATION RATE AND FREQUENCY

In municipalities across Ontario, oil field brine is applied twice per season, and often up to 3 to 4 times. Drier seasons may warrant even more applications of product. Industrial applications rates vary from 3 to 18 L/m^2, which may have an effective period as short as 2 weeks under certain industrial use conditions. Municipalities apply from 1.5 to 3.2 L/m^2 throughout South Western Ontario depending on the need, climatic conditions, and surface conditions/compositions. Application rates do not vary for subsequent applications.

Ponding should be avoided during application. Ponding will depend on several factors: the rate of oil field brine discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care should also be taken to ensure that the liquid is applied at or below the suggested rates. If ponding still occurs, then a decrease in the application rate is necessary.

CURING TIME

Traffic may be allowed on the road immediately after application. Curing time (12 to 24 hours) depends on relative humidity and ambient temperature after application.

PROBLEMS/HAZARDS

Roads treated with oil field brine may be slippery after periods of rain.

MATERIAL SAFETY DATA SHEET

I PRODUCT IDENTIFICATION	
MANUFACTURER'S NAME DEN-MAR BRINES LIMITED	REGULAR TELEPHONE NO 519-695-2805 EMERGENCY TELEPHONE NO
ADDRESS R.R. #3 BOTHWELL, ONTARIO. NOP 1CO	
TRADE NAME DEN-MAR BRINES LIMITED	
SYNONYMS "LIQUID BALLAST"-DUST CONTROL	

II HAZARDOUS INGREDIENTS		
MATERIAL OR COMPONENT	%	HAZARD DATA
None - This material is about a 30% solution		
of calcium, sodium and magnesium chloride in		
water.		

III PHYSICAL DATA			
BOILING POINT 760 MM HG	Higher than water	MELTING POINT	-30°C
SPECIFIC GRAVITY (H_2O=1)	1.2 +	VAPOR PRESSURE	Less than water
VAPOR DENSITY (AIR=1)	Less than water	SOLUBILITY IN H_2O, % BY WT	Infinitely
% VOLATILES BY VOL	75%	EVAPORATION RATE (BUTYL ACETATE=1)	0.1 or less
APPEARANCE AND ODOR	Clear and odour-free		

IV FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)	No Flash Point	AUTOIGNITION TEMPERATURE	None
FLAMMABLE LIMITS IN AIR % BY VOL	NON FLAMMABLE	LOWER	
EXTINGUISHING MEDIA	Self - Extinguishing		
SPECIAL FIRE FIGHTING PROCEDURES	None		
UNUSUAL FIRE AND EXPLOSION HAZARD	None		

V HEALTH HAZARD INFORMATION

HEALTH HAZARD DATA

ROUTES OF EXPOSURE

INHALATION	Liquid Inhalation of spray may cause irritation
SKIN CONTACT	May cause slight itch
SKIN ABSORPTION	Nil
EYE CONTACT	Will cause irritation
INGESTION	May cause discomfort, also may be absorbed through digestive tract

EFFECTS OF OVEREXPOSURE	No effects
ACUTE OVEREXPOSURE	None, unless fall occurs into container
CHRONIC OVEREXPOSURE	Nil

EMERGENCY AND FIRST AID PROCEDURES

EYES	Wash out with water
SKIN	Wash out with water
INHALATION	No vapour except water
INGESTION	Drink adequate water for dilution

NOTES TO PHYSICIAN: Water dilution is best in all cases

VI REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY

None

INCOMPATIBILITY

Insoluble in most organic liquids

HAZARDOUS DECOMPOSITION PRODUCTS

None

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

Does not polymerize

VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Use any type of absorbent. Also, water can be used for dilution where this is reasonable.

NEUTRALIZING CHEMICALS

None required

WASTE DISPOSAL METHOD

When sufficiently diluted the impact on the environment is nil.

VIII SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

None

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY (SPECIFY IN DETAIL)

Nothing but water vapour is given off unless heavy liquid is splashed or sprayed

EYE

Use goggles - wash with water if eyes get contaminated

GLOVES

Should be used

OTHER CLOTHING AND EQUIPMENT

Rubber boots and aprons for massive general exposure to spills

IX SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS

This is a water solution of calcium chloride, sodium chloride and magnesium chloride with traces of related chloride salts. In effect, it is concentrated sea water.

OTHER HANDLING AND STORAGE REQUIREMENTS

Nothing special. Steel will rust more quickly than it will with water only.

PREPARED BY D. S. ALEXANDER M.Sc., F.C.I.C.

ADDRESS LAMBTON SCIENTIFIC INC., SARNIA, ONTARIO

DATE OCTOBER 24, 1983

APPENDIX F.3

Tembind

PRODUCT APPLICATION SHEET FOR TEMBIND A-002

A. GENERAL INFORMATION

DESCRIPTION

Tembind A-002 is a 50 percent solids solution of lignin sulphonate and is classified as a lignosulphonic acid-ammonium salt. Tembind A-002 is commonly called an ammonium lignosulphonate. In its liquid form, it is a dark brown solution with a woody odour. In its processed dry form, it is a brown powder with the same odour. Tembind A-002 is manufactured from the lignin content in trees. It is usually diluted with water to a 25 or 35 percent solids solution, called Tembind 25 and Tembind 35. Tembind A-002 is also used as a dispersant and water reducer in concrete, as a pellet binder in animal feed, in animal molasses, and as a replacement for formaldehyde in particle board.

MANUFACTURER AND SUPPLIER

Temfibre Inc.
P.O. Box 3000
George Petty Road
Temiscaming, Quebec
J0Z 3R0

Telephone: (819) 627-9505
Contact: Jim McCallum

Temfibre Inc. also distributes the product.

APPLICATORS/CONTRACTORS INFORMATION

Jim McCallum ((819) 627-9505) of Temfibre Inc. or Mr. Larry Ellerker ((416) 235-4046) of the Ontario Ministry of Transportation can be contacted for information on applicators of Tembind.

B. HANDLING PROCEDURES

PERSONAL PROTECTION

Since Tembind A-002 is a non-corrosive or reactive, natural, biodegradable dust suppressant, only minimal protection is required in its handling, such as impervious gloves and safety goggles.

EMERGENCY FIRST AID

First aid procedures are listed in the attached Material Safety Data Sheet for Tembind A-002.

TRANSPORTATION AND SHIPPING REQUIREMENTS

Tembind is transported in tanker trailer trucks of 27,000 litre capacity or more. No special precautions are necessary beyond normal transportation of liquids.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application rate, into the natural environment. This can be caused by spray bars left on after operation, tank rupture, tank overturn, etc. In the event of a spill the following procedures are recommended:

1. Further loss of product should be limited or halted.

2. The following people/organizations should be contacted:

    - The Ministry of the Environment at the Spills Action Centre 1-(800)-268-6060.

    - Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular).

    - The contractor management.

    - The local municipality.

    - The owner/lessee of the vehicle and/or the shipper/owner of the product.

    - Temfibre emergency numbers:

        - North Bay Terminal: (800) 461-7310 or (705) 495-2195
        - Temiscaming: (819) 627-9505
        - After Hours: (819) 627-3321

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

Caution is advised when applying lignosulphonates near trout spawning areas to prevent runoff. According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants, product dust suppressants should not be applied to sites closely adjacent to or crossing waterway(s) or marshes, or near wells.

SURFACE PREPARATION

There are several ways to prepare the road for application of Tembind. The methods generally include: initial grading of the surface to remove potholes, corrugations, and to loosen the surface material, and spraying the Tembind in layers and allowing it to penetrate the surface. Some methods suggest a second grading before the last spray to remix the road material and Tembind.

The following are two methods of application that have been tested by the Ontario Ministry of Transportation using Tembind 35. Each method contains road preparation steps. Although no conclusions were drawn in the study report, results suggest that these two methods of application provide optimum performance of Tembind 35.

Application Method 1

1. The road surface should be graded 7.6 cm deep to remove all corrugations, potholes, and to loosen the road surface material to the penetration depth desired.

2. The road should be graded 5.0 cm deep in a manner to leave a windrow on both sides. The distance between the windrow should be 6.1 m wide.

3. The road surface between the windrows should be sprayed at a recommended application rate of 0.91 L/m^2.

4. The road surface should be graded 5.0 cm deep from the right side to the left side and back to the right side, in the same manner as mixing mulch. It might be necessary to make an extra pass with the grader to mix and level the material properly.

5. The road surface should be sprayed again 6.1 m wide at a recommended application rate of 0.91 L/m.

6. The road surface should be regraded 5.0 cm deep from the left to the right side and back to the left side, in the same manner as mixing mulch. Again it might be necessary to make an extra pass with the grader to mix and level the material properly.

7. The finished grade should be left with a crown of 4.2 cm per m from the centre-line to the edge of the road.

8. The dust control product should again be sprayed on the finished grade 6.7 m wide, at a recommended application rate of 0.91 L/m^2.

Application Method 2

1. The road surface should be graded 7.6 cm deep to get rid of all corrugations, pot-holes, and to loosen the road surface material to the penetration depth desired.

2. The road surface should be sprayed 6.1 m wide at the recommended application rate of 0.91 m/L^2.

3. The dust control product should be allowed to penetrate into the road surface.

4. The road surface should again be sprayed 6.1 m wide at the recommended application rate of 0.91 L/m^2.

5. The dust control product should again be allowed to penetrate into the road surface.

6. The road surface should be graded approximately 2.5 cm deep, leaving the finished grade with a crown of 4.2 cm per m from the centre-line to the edge of the road.

7. The dust control product should be sprayed on the finished grade 6.7 m wide at the recommended application rate of 0.91 L/m^2.

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Application of Tembind is generally made about 6 to 12 hours after a significant rainfall, depending on the time of year. Application should be made 12 to 24 hours before the next rainfall, depending on humidity, to permit curing and hardening of the surface, and to prevent leaching and runoff.

EQUIPMENT

A recommended equipment list includes:

- A pressure distributor which is self propelled and capable of maintaining any speed required for spraying.
- A quick opening gate in the dome.
- An external readily visible depth gauge with 50 litre accuracy.
- A pump capable of supplying the required constant manifold pressure.
- Rear mounted spray bars and nozzles 1 to 3 m wide capable of:
  - vertical and lateral adjustment
  - instant shut off
  - spraying of the shoulder
  - producing double coverage in one pass.
- Spray bars that do not extend into the lane of opposing traffic unless adequate warning measures are taken.
- Spray bars equipped with pressure gauges accurate to 15 kPa.
- A dipstick calibrated in 200 L increments.
- The feed to the spray bars equipped with:
  - recirculation before and during operation
  - filters.
- Spray nozzles:
  - fitted with instant on/off valves and,
  - which yield fan-shaped sprays without atomization.
- Splash guards for shoulder spraying.
- A pressure pump capable of applying a minimum of 120 litres of material per minute per meter spray bar.
- An operator visible 15 kPa pressure gauge.
- An operator visible flow meter.
- An operator visible fifth wheel tachometer calibrated in meters per minute.

PERSONNEL REQUIREMENTS

Typically, two to four people are required for safe application. This would consist of at least one, maybe two, flag persons and/or operator of a pilot warning vehicle, the application truck operator, and a application checker (however, the flag person can double as this person).

DILUTION

Tembind is shipped to its applicators as a 50 percent solids solution. At the applicator's storage facility Tembind is diluted with water to the required solution strength prior to transportation to the site. Typical dilutions yield the 25 to 35 percent solids concentrations. Higher concentrations have been used in the past for surfaces with higher sand contents. However, this practice is now not common.

Tembind should not be heated to temperatures above 200 °C or mixed with any materials other than water.

APPLICATION RATE AND FREQUENCY

Recommended rates of application for Tembind vary depending on the location and solution strength. Application rates from various sources are tabulated below for comparison. It should be noted that only Temfibre provides yearly application guidelines for subsequent road treatments while other studies provide application guidelines per treatment. Application rates can be scaled up or down depending on the Tembind concentration.

Temfibre Seasonal Application Data[1]
Tembind 25

Average Daily Traffic	Number of Applications of Tembind Per Year (25% Solids Solution)	L/m²		
		Initial	Second	Third
<100	2	0.71	0.36	-
100-250	3	0.71	0.36	0.36
250	3	0.71	0.71	0.36

Notes:

1. Temfibre recommendations for seasonal application.

Suggested Applications Per Treatment Tembind 35			
Total Application L/m^2	Application Rate (35% Solids Solution)		
	First Step L/m^2	Second Step L/m^2	Third Step L/m^2
2.2[1]	0.73	0.73	0.73
2.2[1]	1.1	1.1	0
2.73[2]	0.91	0.91	0.91

Notes:

1. Aquin, 1986
2. McDougall, 1986

Generally, contractors in Ontario are applying Tembind 25 with satisfactory results.

Ponding should be avoided during application. Ponding will depend on several factors including the rate of Tembind discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care should also be taken to ensure that the liquid is applied at or below the suggested rates. If ponding still occurs then a decrease in the application rate is necessary.

CURING TIME

Complete curing time is anywhere from 12 to 24 hours. Traffic can be permitted onto fresh surfaces, but it has been suggested that speeds be reduced for at least 2 hours.

Temfibre INC.

C.P. 3000 TEMISCAMING (QUEBEC)
CANADA J0Z 3R0
TEL. 819-627-9505
TEX. 067-76281
FAX. 819-627-3622

MATERIAL SAFETY DATA SHEET

SECTION I

Chemical Name	:	Lignin Sulfonates
Trade Name	:	Tembind A, S, K, Temsperse S, K
Chemical Family	:	Salts of lignin sulfonic acids.
Formula	:	Polymeric form of lignosulfonic acids with ammoniumm, soidium or potassium as cations.
CAS Registry No.	:	Ammonia base - 8061-53-8 (lignosulfonic acid ammonium salt) Sodium base - 8061-51-6 (lignosulfonic aicd sodium salt)

SECTION II - PHYSICAL DATA

Boiling point	:	105°C
Melting point	:	-5°C
Specific gravity @ 25°C	:	1.23 (of a 48% solution)
Solubility in water	:	Liquid - complete; powder - 550 g/l
Appearance and odor	:	Brown powder, dark brown solution. Woody smell

SECTION III - FIRE AND EXPLOSION HAZARD DATA

Flash point	:	n/a
Auto ignition temperature	:	n/a
Extinguishing media	:	Water, foams, dry powder, carbon dioxide.

SECTION IV - HEALTH HAZARD DATA

Threshold limit value (TLV)	:	None known
LD50	:	Tembind A - 20,000 mg/kg of body weight for rats.
Eye irritation:	:	None (very low V.P.)
Skin irritation:	:	None
Effects of over exposur	:	None
Eye contact:	:	Minor temprary irritations possible.
Skin contact:	:	None
Inhalation:	:	Not applicable
Ingestion:	:	Not applicable

Temfibre INC.

SECTION V - REACTIVITY DATA

Stability (Thermal,light,etc)	:	Stable
Conditions to avoid	:	None
Hazardous polyermization	:	Will not occur
Conditions tc avoid	:	None
Incompatability (Materials to avoid)	:	None
Hazardous decomposition products:		Sulfur dioxide released from burning. Ammonia released from strong alkaline addition

SECTION VI - SPILL OR LEAK PROCEDURES

Precautions if material is released or spilled	:	Normal sweeping, vacuuming or washing with water
Waste disposal methods	:	Domestic or industrial sewers

SECTION VII - SPECIAL PROTECTION INFORMATION

Eye protection	:	Goggles preferable but not necessary
Respiratory protection	:	Face mask preferable but not necessary (dust problem for powders only)
Skin Protection	:	Not necessary
Ventilation	:	Dust problem only

SECTION VIII - SPECIAL PRECAUTIONS

Handling and Storage	:	None

SECTION IX - SHIPPING REGULATIONS

These are non-hazardous materials and therefore no special handling regulations are applicable.

APPENDIX F.4

Domtar Road Binder

PRODUCT APPLICATION SHEET FOR DOMTAR ROAD BINDER

A. GENERAL INFORMATION

DESCRIPTION

Road Binder is a sodium carbonate based spent pulping liquor from Domtar Packaging containing from 10 to 30 percent solids. It is a black/brown liquid with a faint woody smell. Road Binder is a solution of short-chain carboxylates, polysaccharides, lignin, and lignin breakdown products, sodium carbonate, and suspended solids (wood and bark fragments).

MANUFACTURER/SUPPLIER

Domtar Packaging
Container Board Division
Trenton Mill
Trenton, Ontario

Contact: Jim McKee
Telephone: (613) 392-6505

Domtar produces and distributes Road Binder.

APPLICATORS

Jim McKee of Domtar (613) 392-6505 can be contacted for information on applicators of Road Binder for dust suppression.

B. SAFETY PROCEDURES

PERSONAL PROTECTION

Since Road Binder is a biodegradable, non-corrosive product, minimal protection is required when handling. Domtar recommends gloves impervious to aqueous mixtures, and safety glasses or goggles be worn when during handling.

EMERGENCY FIRST AID

Emergency first aid procedures are listed in the attached Material Safety Data Sheet for Road Binder.

TRANSPORTATION AND SHIPPING REQUIREMENTS

Road Binder is transported by Domtar in 8,200 litre and 12,700 litre tanks supplied by Domtar for single and double axle dump trucks, or municipal tanker trucks.

Since Road Binder is currently classified as a liquid industrial waste in Ontario, each load must be accompanied by a Provincial manifest. Correspondingly, the equipment used to haul each load must meet the approved standards prescribed under Ontario Regulation 309.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application into the natural environment. This can be caused by spray bars left on after operation, tank rupture, tank overturn, etc. In the event of a spill the following procedures are recommended:

1. If possible, the spilled Road Binder should be contained in a ditch or within the road allowance, and prevented from entering watercourses and storm sewers.

2. The following persons should be notified immediately (in the order set out):

    - The Ontario Ministry of the Environment at this number: Spills Action Centre 1-800-268-6060;
    - Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular);
    - The municipality in which the spill occurred;
    - The foreman or supervisor; and
    - Domtar Packaging at the Trenton Mill at:
        - Mr. Jim McKee - 7:30 am to 4:30 pm - (613) 392-6505
        - Production Foreman - After Hours - (613) 392-6505

3. Operators should take appropriate action to contain the spill as follows:

- Operators should make arrangements to have a vacuum sump truck attend at the site to remove all Road Binder which has collected in pools or ditches.

- Objects, articles, buildings or vehicles which were splashed with Road Binder in the spill event should be cleaned with water.

- Lawns and other landscape and garden plants should be flushed with large volumes of water.

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

Domtar suggests that Road Binder should not be applied on any bridge or on bridge approaches where the road crosses water courses such as rivers, streams or marshes. In addition, Road Binder should not be applied on any road areas within 30 meters of a well.

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants year, they should not be applied to sites closely adjacent to or crossing waterway(s) or marshes, or near wells.

SURFACE PREPARATION

Road preparation generally involves grading a road in spring to a sufficient depth to remove all potholes and corrugations. Grading also loosens up the surface to provide some porosity which facilitates better penetration of Road Binder. It is important that the road contain some moisture from either rain or watering to facilitate the best grading results.

After grading, the road is sprayed with Road Binder at desired levels. Some municipalities grade the roads before every application while others grade only in the spring and once or twice more throughout the season. If subsequent applications are made because of dust complaints, Road Binder is applied directly to the road without prior grading. Areas of road that have developed potholes and corrugation will receive light grading.

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Municipal experience has found that application of Road Binder made while the road surface is dry yet still contains some moisture results in the best performance. Usually, this is about 6 to 12 hours after a significant rainfall, depending on the time of year. Application should be made 12 to 24 hours before the next rainfall, depending on humidity, to permit curing and hardening of the surface. If heavy rains are expected, the product should not be applied until afterwards to prevent leaching and runoff.

APPLICATION EQIUPMENT

Equipment used to apply Road Binder may be supplied by the applicator, or can be supplied by Domtar. Domtar recommends certain minimum standards of equipment which they supply. These are outlined below (Domtar Instruction Manual):

- Tanks supplied by Domtar that sit on dumptrucks are 8,200 L for single axle dump truck and 13,000 L for tandem axle dump trucks.
- Tanks should contain a top-loading hatch with drop-in cover plates and hinged lock cover over the hatch.
- Road Binder should not be applied from a truck that is noticeably slowing down when travelling uphill to prevent excessive application. Application should be made on downgrades in such cases.
- The discharge line from the tank to the spreader bar should have an air-operated ball valve followed by a manually operated valve just prior to the spreader bar.
- The air-operated ball valve control should be located in the truck cab.
- Spreader bars should have 1.9 cm holes spaced 6.35 cm apart along the underside with a 6.35 cm by 1.9 cm slot in the middle.
- Spreader bars should have threaded caps on the end.
- Spray bars not supplied by Domtar should not extend beyond the edge of the road to avoid shoulder spraying.

The above equipment specifications have been established and approved by Domtar and the municipalities that have used Road Binder. Other equipment specifications that may be considered more comprehensive are those for the application of lignosulphonates, outlined by the Ontario Ministry of Transportation (1988).

These additional requirements are for the pressure distributor. It should be self propelled and capable of maintaining any speed required for spraying, and should have the following equipment:

- A pump capable of supplying the required constant manifold pressure.
- Rear mounted spray bars and nozzles 1 to 3 m wide capable of:
  - vertical and lateral adjustment
  - instant shut off
  - spraying the shoulder
  - producing double coverage in one pass.
- Spray bars equipped with pressure gauges accurate to 15 kPa.
- A dipstick calibrated in 200 L increments.
- The feed to the spray bars equipped with filters.
- Spray nozzles fitted with instant on/off valves and that yield fan-shaped sprays without atomization.
- Splash guards for shoulder spraying.

PERSONNEL REQUIREMENTS

Typically, two to four people are required for safe application of Road Binder. This would consist of at least one, maybe two, flag person(s) and/or operator(s) of a pilot vehicle (warning vehicle), the application truck operator, and a checker (the flag person can double as a checker). If contractors are used, then only supervision by the customer may be necessary.

DILUTION

If concentrated Road Binder (solution 30-40 percent solids) is obtained from Domtar for the purpose of transporting long distances, then dilution with water for a final concentration of 20 to 25 percent solids is suggested for most normal municipal road conditions. Heavier traffic or industrial conditions may warrant the more concentrated solution. It has been suggested by Domtar and the local municipalities that the best results are achieved with the 20 to 25 percent solution.

Domtar's Road Binder should not be mixed with any materials other than water for the purpose of dilution.

APPLICATION RATES AND FREQUENCY

Road Binder application rates are usually the same for initial and subsequent applications, since the material has a relatively short effective lifetime. Applications are generally from 1.56 L/m^2 (Acres, 1990) to 1.65 L/m^2. Domtar does not have a recommended application frequency. Municipal experience suggests application may be as frequent as every few days to once every month. It is generally accepted that Road Binder is applied as needed.

Ponding should be avoided during application. Note that ponding can result at or below the maximum recommended application rates. Ponding will depend on several factors; the rate of Road Binder discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care should also be taken to ensure that the liquid is applied at or below the suggested rates. If ponding still occurs, then a decrease in the application rate is necessary.

CURING TIME

Curing time of Road Binder varies with climatic conditions. Road Binder dries to the touch within 1/2 hour and can be driven on immediately after application. However, to receive maximum performance, traffic should be reduced in speed, or at best, restricted for a few hours. A period of 24 hours permits complete curing to a hard impervious crust (Domtar, November, 1987).

PROBLEMS/HAZARDS

Heavy rain falls may make roads treated with Road Binder more slippery than untreated roads.

MATERIAL SAFETY DATA SHEET

SECTION I - PRODUCT AND PREPARATION INFORMATION

[redacted]
EMERGENCY: 514 - 331 - 6100
CANUTEC : 613 - 996 - 6666
[redacted]

Trade Name: DOMTAR ROAD BINDER

Synonym: SPENT PULPING LIQUOR (SODIUM CARBONATE BASE)
Product Code: PACKCO 0005
Chemical Name and Synonym:

Manufacturer

DOMTAR PACKAGING
CONTAINERBOARD DIVISION
TRENTON MILL
TRENTON, ONTARIO

Supplier

Chemical Family: N/AP
Formula: N/AV
TDG Shipping Name: N/AP
TDG Hazard Class: N/AP
WHMIS Class: N/AP

Hazard Rating

Health: 1 Flammability: 0
Reactivity: 1

NOT CLASSED AS HAZARDOUS

Preparation Date: October 21, 1988

Name of Department Preparing MSDS
DIVISION HEAD OFFICE
MALTON, ONTARIO
Information Tel. #: (416) 671 7409
NAME Signature of Preparer:
DR. R.S. ALLAN

Product Use:

ROAD BINDER/DUST SUPPRESSANT
THE PRODUCT DESCRIBED HERE IS A SOLUTION OF SHORT-CHAIN CARBOXYLATES, POLYSACCHARIDES, LIGNIN AND LIGNIN-BREAKDOWN PRODUCTS, SODIUM CARBONATE WITH SOME SUSPENDED SOLIDS (WOOD & BARK FRAGMENTS).

SECTION II - HAZARDOUS INGREDIENTS

CHEMICAL IDENTITY	CAS NUMBER	PER CENT BY WEIGHT
NO HAZARDOUS INGREDIENTS ABOVE 0.1% LEVEL.		

SECTION III - PHYSICAL DATA

Physical State (room temperature)	LIQUID, 10-35% TOTAL SOLIDS (USUALLY 20-2
Odour and Appearance	FAINT, WOODY ODOUR; BROWN/BLACK COLOUR
Odour Threshold	NOT AVAILABLE
Boiling Point	APPROXIMATELY 100°C
Freezing Point	APPROXIMATELY 0°C
Percent Volatile by Volume	65-90%
Specific Gravity	APPROXIMATELY 1.1
Evaporation Rate (butyl acetate = 1)	NOT AVAILABLE
Vapour Pressure	SAME AS WATER
Vapour Density (air = 1)	NOT AVAILABLE
pH	8.6 -- 8.7
Coefficient of water/oil distribution	NOT AVAILABLE
Solubility in water	NOT APPLICABLE

SECTION IV - FIRE OR EXPLOSION HAZARDS

Conditions of Flamability	NON-FLAMMABLE
Extinguishing Media	NOT APPLICABLE
Hazardous Combustion Products	NOT APPLICABLE
Special Fire Fighting Procedures	NOT APPLICABLE
Flash Point & Method of Determination	NOT APPLICABLE
Upper Flammable Limit	NOT APPLICABLE
Lower Flammable Limit	NOT APPLICABLE
Auto-ignition Temperature	NOT APPLICABLE

Explosion Data
Sensitivity to mechanical impact N/AP : Sensitivity to static discharge N/AP :

SECTION V - REACTIVITY DATA

Stability	STABLE
Conditions to Avoid	LONG TERM STORAGE IN CLOSED CONTAINERS SHOULD BE AVOIDED.
Incompatible Substances	CONTACT WITH STRONG ACID COULD LEAD TO FOAM GENERATION
Hazardous Decomposition Products	NOT APPLICABLE
Hazardous Polymerization	WILL NOT OCCUR

SECTION VI - TOXICOLOGICAL PROPERTIES

Route of Entry : Skin contact X Skin absorption ____ Eye contact X
Inhalation ____ Ingestion ____

Effects of Acute Exposure ..: INFORMATION NOT AVAILABLE

Effects of Chronic Exposure : INFORMATION NOT AVAILABLE

EXPOSURE LIMITS

CHEMICAL COMPONENT	TWA	ACGIH TLV	LC50	LD50	IDLH
NOT AVAILABLE					

IDLH: immediately dangerous to life/health

Irritancy .....: NOT AVAILABLE

Sensitization .....: NOT AVAILABLE

Carcinogenicity.....: NOT AVAILABLE

Reproductive Toxicity: NOT AVAILABLE

Teratogenicity .....: NOT AVAILABLE

Mutagenicity .....: NOT AVAILABLE

Toxicologically Synergistic Products: NOT AVAILABLE

SECTION VII - PREVENTIVE MEASURES

Hand Protection.....: GLOVES IMPERVIOUS TO AQUEOUS MIXTURES
Eye Protection.....: SAFETY GLASSES OR GOGGLES ADVISED
Respiratory Protection.: NOT APPLICABLE
Body Protection.....: NOT APPLICABLE
Foot Protection.....: NOT APPLICABLE
Ventilation Controls...: NOT NORMALLY REQUIRED

Steps to be taken in case of a leak or spill:

MOP UP OR HOSE DOWN

Waste disposal method:

CLASSED AS AN INDUSTRIAL WASTE IN ITS PRESENT USE -- CUSTOMARY PROCEDURES FOR NON-HAZARDOUS INDUSTRIAL WASTE TREATMENT.

Precautions to be taken in handling and storing:

STORE IN OPEN CONTAINERS AND/OR VENTILATE WELL. USE CAUTION WHEN OPENING UNVENTED CONTAINERS. MICROBIAL ACTIVITY MAY CAUSE ACCUMULATION OF COMBUSTIBLE GAS.

Special shipping requirements:

NONE

SECTION VIII - FIRST AID MEASURES

Skin Contact.....: WASH AFFECTED AREA COPIOUSLY WITH WATER

Eye Contact.....: RINSE WITH RUNNING WATER FOR AT LEAST 15 MINUTES

Inhalation.....: NOT APPLICABLE

Ingestion.....: NOT APPLICABLE

Disclaimer: DOMTAR BELIEVES THE ABOVE INFORMATION IS RELIABLE. HANDLING OF THE DESIGNATED PRODUCT SHALL BE RESTRICTED TO QUALIFIED PERSONS. DOMTAR MAKES NO WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO SUCH INFORMATION AND ASSUMES NO RESPONSIBILITY WHATSOEVER FOR ANY DAMAGE WHICH RESULTS FROM THE USE OF SUCH INFORMATION OR THE DESIGNATED PRODUCT. USERS MUST MAKE THEIR OWN TESTS WHEN USING THE DESIGNATED PRODUCT WITH ANY OTHER PRODUCT OR ANY PROCESS.

APPENDIX F.5

DCS-225

PRODUCT APPLICATION SHEET FOR DCS-225

A. GENERAL INFORMATION

DESCRIPTION

DCS-225 distributed in Ontario by NorJohn Ltd., is a dark brown liquid with a sulphurous odour. It is a blend of tall oil, asphalt, and water, which falls into the general category of an emulsified asphalt resin, and is in the chemical family of petroleum hydrocarbons. DCS-225 is used as a road dust suppressant, a stock pile dust suppressant for coal and flash, as well as for road shoulder spraying. Generally, the concentrated liquid is diluted with water in a 3 to 1, water to product mix, for road application.

MANUFACTURER

NorJohn Ltd.
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Telephone: (416) 356-7222
Contact: Dave Bratley

NorJohn, who blends DCS-225 is also the supplier.

APPLICATORS/CONTRACTORS

Dave Bratley of NorJohn (416) 356-7222 should be contacted to provide information on applicators of DCS-225 in Ontario. NorJohn also provides application services.

B. HANDLING PROCEDURES

The following safety procedures are recommended for the handling of DCS-225.

PERSONAL PROTECTION

1. Operators should avoid any eye or skin contact.

2. Operators should wear gloves with gauntlets. Gloves should not be made of natural rubber or PCV.

3. Operators should wear either splash proof chemical goggles or an 8" face shield if splashing or eye contact is possible.

4. Operators are not required to wear respirators under normal operating conditions.

5. Operators should wear approved air purifying respirators for dust/fumes/mist and organic vapours, or wear supplied air respirator if in enclosed areas.

6. Operators should wear long sleeve loose fitting clothing, closed at the neck and tight at the waist.

7. Operators should wear impervious safety boots.

EMERGENCY FIRST AID

First aid procedures are outlined in the attached Material Safety Data Sheet (1990) for DCS-225.

TRANSPORTATION REQUIREMENTS

The concentrated product is shipped at slightly elevated temperatures to aid in pumping at the discharge site. Diluted DCS-225 is not elevated in temperature during shipping or pumping. All other precautions necessary in the transportation of industrial hydrocarbon liquids should be exercised.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application rate, into the natural environment. This can be caused by spray bars left on after operation, tank rupture, tank over turn, etc. In the event of a spill the following procedures are recommended:

1. The spill should be contained using sand or earth to prevent DCS-225 from entering waterways or low areas. All sources of ignition must be removed.

2. As much of the DCS-225 should be recovered with pumping equipment or absorbent material.

3. The remaining spilled DCS-225 should be absorbed with sand or clay.

4. The following should be contacted:

   - The local municipal authorities.
   - The Ontario Ministry of the Environment Spills Action Centre at 1-800-268-6060.
   - Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular).
   - Norjohn Ltd.
   - The applicator.

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants, dust suppressants should not be applied to sites closely adjacent to or crossing waterway(s) or marshes, or near wells.

SURFACE PREPARATION

Preparation of road surfaces should be as follows:

1. Proper drainage should be provided on both sides of the road.

2. The surface should be graded to a significant depth (20 to 50 mm) to remove pot holes, corrugations and other ruts. If the road is deeply rutted or corrugated it may require scarification up to 100 mm.

3. Gravel or fines should be added as required to yield a final composition of 10 to 15 percent fines (< 200 mesh).

4. The road should be shaped to the correct crown (about 4% straight line) using a grader equipped with a straight flat blade.

5. The DCS-225 should be applied at desired levels while the surface is still a little moist.

6. If the road on surface is being constructed, compaction of the surface is suggested to provide a firm solid base.

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Current and past users of DCS-225 have recommended that if heavy rainfall is forecast within 24 hours, application of DCS-225 should be postponed until after such rainfall to avoid leaching and runoff. DCS-225 should be applied while the road has some moisture remaining, within 12 to 24 hours after a significant rainfall.

APPLICATION EQUIPMENT

Application equipment for petroleum based products and oils is usually a bituminous distributor. The Ontario Ministry of Transportation requires that the distributor be equipped with a pump capable of developing a constant uniform pressure in the spray bar manifold. In addition, the spray bar must be capable of application over a variety of widths. The distributor tank should also come equipped with a dip stick for measuring quantities applied.

The equipment list for bituminous distributors also contains the following:

- Recirculation in the tank.
- A quick opening gate in the dome.
- An external readily visible tank gauge.
- Rear mounted spray bars and nozzles 0.6 to 3.6 m wide capable of:
  - vertical and lateral adjustment
  - producing double coverage in one pass.
- Spray bars that do not extend into the lane of opposing traffic unless adequate warning measures are taken.
- The feed to the spray bars equipped with:
  - recirculation before and during operation
  - filters.
- Spray nozzles:
  - fitted with instant on/off valves, and
  - which yield fan-shaped sprays without atomization.
- A pressure pump capable of supplying approximately 726 L/min of product.
- An operator visible 345 MPa pressure gauge.

- An operator visible flow meter.
- An operator visible pump tachometer.

PERSONNEL REQUIREMENTS

Typically two to four people are required for safe application of dust suppressants. This would consist of at least one, maybe two, flag-persons and/or an operator of a warning pilot vehicle, the operator of the application truck, and an application checker (the flag person can double as a checker)

DILUTION

DCS-225 is to be mixed with three parts water to one part product for optimum performance. DCS-225 should not be mixed with any other materials, especially any strong oxidizing agents.

APPLICATION RATE AND FREQUENCY

NorJohn has recommended that diluted DCS-225 be applied in two equal coats at 0.9 L/m^2 each for a total of 1.8 L/m^2. This procedure would facilitate pre-wetting of the surface particles for the second application. Subsequent applications are at the same rate. Usual municipal application of DCS-225 is twice per year.

Ponding should be avoided during application. Ponding will depend on several factors; the rate of dust suppressant discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care should be taken to ensure that the liquid is applied at or below the suggested rates. If ponding still occurs, then a decrease in the application rate is necessary.

CURING

The curing time for DCS-225 is between two and four hours, depending on the weather, to permit the tall oil to cross link and crust over. Traffic should be restricted to slower speeds for this period of time.

PROBLEM AND HAZARDS

Roads treated with DCS-225 may be more slippery during wet weather than untreated roads.

WALKER INDUSTRIES HOLDINGS LTD
P.O. BOX 100
THOROLD, ONTARIO, L2V 3Y8
(416) 227-4142 :

PRODUCT DCS-225

SECTION 1 : MANUFACTURER INFORMATION

NORJOHN LTD (EMULSION DIV.)

P.O. BOX 100,
THOROLD, ONTARIO
L2V 3Y8
(416) 227-4142

WHMIS CLASSIFICATION.....CLASS D, DIVISION 2(B): MATERIALS CAUSING OTHER TOXIC EFFECTS.
T.D.G. CLASSIFICATION.....NOT REGULATED
PRODUCT NAME.....DCS-225
CHEMICAL FORMULA.....COMPLEX HYDROCARBON MIXTURE
CHEMICAL FAMILY.....PETROLEUM HYDROCARBONS
MATERIAL USE.....DUST CONTROL

SECTION 2 : HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENTS	%	T.L.V.	C.A.S. #	LD/50, ROUTE, SPECIE	LC/50, ROUTE,
FATTY ACID	1.0-5.0%	Nav		74000 Mg/Kg (ORAL/RAT)	Nav
FATTY ACID	1.0-5.0%	Nav		Nav	Nav
FATTY ACID	3.0-7.0%	Nav		Nav	Nav
FATTY ACID	1.0-5.0%	Nav		Nav	Nav
BITUMENS	0.5-1.5%	5 mg/m3	8052-42-4	NAv	NAv
WATER	80-90%	NAv	7732-18-5	NAv	NAv

WHMIS TRADE SECRET EXEMPTION.....A TRADE SECRET EXEMPTION APPLICATION HAS BEEN FILED WITH THE HAZARDOUS MATERIALS INFORMATION REVIEW COMMISSION AS OF 90/05/25. THE REGISTRY NUMBER ASSIGNED TO THIS PRODUCT IS #2524.

SECTION 3 : PHYSICAL DATA

PHYSICAL STATE.....LIQUID
ODOR.....SULPHOROUS ODOUR
ODOR THRESHOLD.....NAv
VAPOR PRESSURE (mmHg).....NAv
VAPOUR DENSITY (AIR=1).....NAv
BY VOLUME.....NAv
BY WEIGHT.....NAv
EVAPORATION RATE.....NAv
BOILING POINT.....100 DEG. C.
FREEZING POINT:.....0 DEGREES C. FOR WATER PHASE
pH.....6-8
SPECIFIC GRAVITY (WATER=1).....NAv
SOLUBILITY IN WATER (% W/W).....COMPLETE

MATERIAL SAFETY DATA SHEET : 00000011
WALKER INDUSTRIES HOLDINGS LTD
P.O. BOX 100
THOROLD, ONTARIO, L2V 3Y8
(416) 227-4142 :

PRODUCT : DCS-225

COEFFICIENT OF WATER\OIL.....NAv
DIST.

SECTION 4 : FIRE & EXPLOSION DATA

FLAMMABILITY.....NOT FLAMMABLE
IF YES, UNDER WHICH
CONDITIONS?
EXTINGUISHING MEDIA.....CARBON DIOXIDE, DRY CHEMICAL, WATER SPRAY, FOAM
SPECIAL PROCEDURES.....FIREFIGHTERS SHOULD WEAR SELF-CONTAINED BREATHING APPARATUS.
FLASH POINT (C), METHOD.....NAv
AUTO IGNITION TEMPERATURE.....NAv
UPPER FLAMMABLE LIMIT (% BY.....NAv
VOL.)
LOWER FLAMMABLE LIMIT (% BY.....NAv
VOL.)
HAZARDOUS COMBUSTION PRODUCTS....CARBON DIOXIDE
CARBON MONOXIDE
SULFUR DIOXIDE

EXPLOSION DATA
SENSITIVITY TO STATIC.....NAv
DISCHARGE
SENSITIVITY TO IMPACT.....NAv
RATE OF BURNING.....NAv

SECTION 5 : REACTIVITY DATA

CHEMICAL STABILITY:
YES.....YES, KEEP AWAY FROM HEAT, SPARKS, OPEN FLAMES.
NO, WHICH CONDITIONS?
COMPATABILITY WITH OTHER
SUBSTANCES:
YES
NO, WHICH ONES?.....STRONG ACIDS
STRONG BASES
STRONG OXIDIZING AGENTS.
REACTIVITY CONDITIONS?.....MAY IGNITE IF OVERHEATED OR IN THE PRESENCE OF STRONG OXIDIZERS
HAZARDOUS PRODUCTS OF.....CARBON MONOXIDE, CARBON DIOXIDE,
DECOMPOSITION
SULFUR DIOXIDE

SECTION 6 : TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY:
SKIN CONTACT.....CONTACT WITH HOT PRODUCT MAY RESULT IN BURNS.
PROLONGED OR REPEATED CONTACT MAY CAUSE IRRITATION AND/OR DERMATITIS.
SKIN ABSORPTION.....NOT ABSORBED THROUGH THE SKIN
EYE CONTACT.....CAN CAUSE SEVERE IRRITATION AND SWELLING OF EYE TISSUES (CONJUNCTIVITIS)
AND CORNEAL BURNS.

WALKER INDUSTRIES HOLDINGS LTD
P.O. BOX 100
THOROLD, ONTARIO, L2V 3Y8
(416) 227-4142 :

DUCT : DCS-225

MAY CAUSE PERMANENT EYE DAMAGE IF CONTACT NOT ELIMINATED IMMEDIATELY.

INHALATION.....MAY CAUSE MODERATE IRRITATION TO THE RESPIRATORY TRACT. MAY AFFECT THE CENTRAL NERVOUS SYSTEM.

INHALATION, CHRONIC.....MAY CAUSE IRRITATION AND DERMATITIS.

INGESTION.....MAY CAUSE IRRITATION OF THE GASTROINTESTINAL TRACT.

EFFECTS OF ACUTE EXPOSURE.....REFER TO ROUTE OF ENTRY

EFFECTS OF CHRONIC EXPOSURE.....REFER TO ROUTE OF ENTRY

LD 50 OF MATERIAL, SPECIES &.....UNKNOWN
ROUTE

LC 50 OF MATERIAL, SPECIES &.....UNKNOWN
ROUTE

EXPOSURE LIMIT OF MATERIAL.....UNKNOWN

IRRITANCY OF MATERIAL.....REFER TO ROUTE OF ENTRY

SENSITIZING CAPABILITY OF.....UNKNOWN
MATERIAL

CARCINOGENICITY OF MATERIAL.....PETROLEUM FRACTION INCLUDES MANY NATURALLY OCCURRING POLYCYCLIC AROMATIC HYDROCARBONS (PAH"s). CERTAIN SPECIES OF PAH"s HAVE BEEN IMPLICATED IN THE INCIDENCE OF SKIN CANCER IN TEST ANIMALS.

REPRODUCTIVE EFFECTS.....NONE KNOWN

SYNERGISTIC MATERIALS.....NONE KNOWN

SECTION 7 : PREVENTATIVE MEASURES

GLOVES/ TYPE.....GLOVES WITH GAUNTLETS. DO NOT WEAR NATURAL RUBBER OR PVC (POLYVINYL CHLORIDE) GLOVES.

RESPIRATORY/TYPE.....NOT REQUIRED UNDER NORMAL CONDITIONS. IN ENCLOSED AREAS, WEAR APPROVED AIR PURIFYING RESPIRATOR FOR DUST/FUMES/MIST AND ORGANIC VAPOURS OR SUPPLIED AIR RESPIRATOR.

EYE/TYPE.....SPLASH PROOF CHEMICAL GOGGLES OR 8" FACE SHIELD

FOOTWEAR/TYPE.....IMPERVIOUS SAFETY BOOTS.

CLOTHING/TYPE.....LONG SLEEVE, LOOSE FITTING CLOTHING, CLOSED AT THE NECK AND TIGHT FITTING AT THE WRIST. HAVE CONTAMINATED CLOTHING WASHED BEFORE RE-USE.

ENGINEERING CONTROLS.....MECHANICAL VENTILATION RECOMMENDED IN ENCLOSED AREAS.

LEAK/SPILL.....CONTAIN THE SPILL.
ABSORB WITH SAND, CLAY, ETC.
ELIMINATE ALL SOURCES OF IGNITION.

WASTE DISPOSAL.....ABSORPTION OR CONTROLLED BURNING.
PLACE ABSORBANT IN CLOSED CONTAINERS AND DISPOSE IN ACCORDANCE WITH MUNICIPAL, PROVINCIAL AND FEDERAL REGULATIONS.

HANDLING PROCEDURES AND EQUIPMENT.....AVOID SKIN AND EYE CONTACT.

STORAGE NEEDS.....STORE AWAY FROM OXIDIZING MATERIALS AND ALL SOURCES OF IGNITION.
KEEP CONTAINER CLOSED WHEN NOT IN USE.
KEEP FROM FREEZING.

SPECIAL SHIPPING INSTRUCTIONS....PRODUCT IS SHIPPED AT ELEVATED TEMPERATURES.

P.O. BOX 100
TEOROLD, ONTARIO, L2V 3Y8
(416) 227-4142 :

PRODUCT : DCS-225

SECTION 8 : FIRST AID MEASURES

EYE CONTACT.....	IMMEDIATELY FLUSH EYES WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.
INGESTION:.....	SEEK MEDICAL ATTENTION IMMEDIATELY.
INHALATION.....	REMOVE VICTIM TO FRESH AIR. IF BREATHING HAS STOPPED PROPERLY TRAINED PERSONNEL SHOULD BEGIN ARTIFICIAL RESPIRATION. GET MEDICAL ATTENTION IMMEDIATELY!
SKIN CONTACT.....	REMOVE FROM SKIN BY WIPING AND WASH THOROUGHLY WITH SOAP AND WATER. BABY OIL IS HELPFUL IN REMOVING RESIDUAL MATERIAL. BURNS - DO NOT ATTEMPT TO REMOVE ASPHALTIC MATERIAL. SEEK MEDICAL ATTENTION IMMEDIATELY.

SECTION 9 : PREPARATION INFORMATION

PREPARED BY:.....	HEALTH AND SAFETY DEPARTMENT
CONTACT PERSON:.....	BRUCE ROGERS - OCCUPATIONAL HEALTH AND SAFETY CO-ORDINATOR
EMERGENCY TELEPHONE NUMBER:.....	(416) 227-4142
**********	**********
DISCLAIMER:.....	NORJOHN LTD BELIEVES THE INFORMATION CONTAINED HEREIN TO BE ACCURATE; HOWEVER, THE DATA AND INFORMATION ARE PRESENTED WITHOUT ANY REPRESENTATION OR WARRANTY, EXPRESSED OR IMPLIED, REGARDING THEIR ACCURACY OR CORRECTNESS. ONCE THIS PRODUCT LEAVES THE PROPERTY OF NORJOHN LTD, THE CONDITIONS OR METHODS OF HANDLING, STORAGE, USE AND DISPOSAL ARE BEYOND THE CONTROL AND KNOWLEDGE OF NORJOHN LTD. FOR THIS AND OTHER REASONS, NORJOHN LTD DOES NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR ANY LOSS, DAMAGE, INJURY OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THIS PRODUCT.
DATED.....	Jun14/90

APPENDIX F.6

Dust Bond

PRODUCT APPLICATION SHEET FOR DUST BOND

A. GENERAL INFORMATION

DESCRIPTION

Dust Bond is a mixture of petroleum resin (60 percent by weight), emulsifier and water (40 percent by weight). It is light in colour with a slight oil odour that dissipates within 24 hours of application on roads. Dust Bond is used only for road dust suppression and road stabilization. It is sold in concentrated form and diluted with water in a five to one, water to concentrate ratio, for application.

MANUFACTURER INFORMATION

Dust Allayers, Inc.
P.O. Box 1178
Mansfield, Ohio 44901

Contact: Mr. Dick Bakir
Phone: (419) 525-4988
Fax: (419) 525-0688

SUPPLIER INFORMATION

Da-Lee Dust Control
350 Jones Road
Box 14
Fruitland, Ontario
L0R 1L0

Contact: Ms. Donna Didtrek
Phone: (416) 643-1135
Fax: (416) 643-2299

APPLICATORS/CONTRACTORS INFORMATION

Donna Didtrek of Da-Lee can be contacted for names of the applicators, other than themselves, to whom they sell Dust Bond concentrate.

B. HANDLING PROCEDURES

The following procedures are recommended by the manufacturer in the handling of Dust Bond.

PERSONAL PROTECTION

1. Operators should wear impervious gloves under normal handling conditions.

2. Operators should wear chemical type goggles or face shield to prevent eye contact during normal handling or if eye contact is likely.

3. Operators should wear NIOSH[1] approved respirators if exposure to mist is possible.

EMERGENCY FIRST AID

First aid procedures are listed in the attached Material Safety Data Sheet for Dust Bond.

TRANSPORTATION AND SHIPPING

No special handling procedures are required other than those required for the transportation of industrial liquid oil products.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application rate, into the natural environment. This is caused by spray bars left on after operation, tank rupture, tank turn over, etc. In the event of a spill the following procedures are recommended:

1. If possible, the spilled Dust Bond should be contained in a ditch or within the road allowance, and prevented from entering watercourses and storm sewers.

2. As much of the Dust Bond as possible should be recovered with pumping equipment.

---

[1] National Institute for Occupational Safety and Health.

3. The remainder of the spill should be absorbed in vermiculite, dry sand, earth, or similar material which should them be disposed of in an approved manner.

4. The following should be contacted:

   - Da-Lee Dust Control: (416) 643-1135
   - The Ministry of the Environment Spills Action Centre: (800) 268-6060.
   - Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular).
   - The local municipality in which the spill occurred.

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants, dust suppressants should not be applied to sites closely adjacent to or crossing waterway(s) or marshes, or near wells.

SURFACE PREPARATION

Preparation of road surfaces should be as follows:

1. Proper drainage should be provided for the road surface on both sides of the road or for the yard.

2. The surface should be graded to a significant depth (20 to 50 mm) to remove pot holes, corrugations and other ruts. If the road is deeply rutted or corrugated it may require scarification up to 100 mm.

3. Gravel or fines should be added as required to yield a final composition of 10 to 15 percent fines (< 200 mesh) (UMA Engineering Ltd., 1987).

4. The road should be shaped to the correct crown (about 4 percent straight line) using a grader equipped with a straight flat blade.

5. The Dust Bond should be applied at desired levels while the surface is still a little moist to prevent dust coated beads on the surface which prevents penetration.

6. If the road or surface is being constructed, compaction of the surface is suggested to provide a firm solid base.

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Current and past users of Dust Bond have recommended that if heavy rainfall is forecast within 24 hours, application of Dust Bond should be postponed until after such rainfall. Dust Bond should be applied within 12 to 24 hours after a significant rainfall while the road has some moisture remaining. Under these conditions, runoff due to rain will be avoided.

APPLICATION EQUIPMENT

Application equipment for petroleum based products is usually a bituminous distributor. The Ontario Ministry of Transportation requires that the distributer be equipped with a pump capable of developing a constant uniform pressure in the spray bar manifold. In addition, the spray bar must be capable of application over a variety of widths. The distributor tank should also come equipped with a dip stick for measuring quantities applied.

The equipment list for bituminous distributors also contains the following:

- Recirculation in the tank.
- A quick opening gate in the dome.
- An external readily visible tank gauge.
- Rear mounted spray bars and nozzles 0.6 to 3.6 m wide capable of:
  - vertical and lateral adjustment
  - producing double coverage in one pass.
- Spray bars must not extend into the lane of opposing traffic unless adequate warning measures are taken.
- The feed to the spray bars should be equipped with:
  - recirculation before and during operation
  - filters.
- Spray nozzles should be:
  - fitted with instant on/off valves, and
  - which yield fan-shaped sprays without atomization.
- A pressure pump capable of supplying approximately 726 L/min of oil.
- An operator visible 345 MPa pressure gauge.
- An operator visible flow meter.

- An operator visible pump tachometer.

PERSONNEL REQUIREMENTS

Typically, two to four people are required for safe application of dust suppressants. This would consist of at least one, maybe two, flag-persons and/or an operator of a warning pilot vehicle, the operator of the application truck, and an application checker (the flag person can double as a checker).

DILUTION

Dust Bond is to be mixed with five parts water to one part Dust Bond for optimum performance. Dust Bond should not be mixed with any other materials, especially any strong oxidizing agents such as hydrogen peroxide bromine, and chromic acid.

APPLICATION RATE AND FREQUENCY

Da-Lee has recommended various application rates depending on the traffic load. These rates are summarized below:

Traffic Level	First Application		Second Application (L/m^2)	Third Application (as needed when dust reoccurs) (L/m^2)	Yearly Total (L/m^2)
	First Pass (L/m^2)	Second Pass (L/m^2)			
Light to medium <250 ADT[1] (cars and pick up)	1.35	1.35	1.35 (2 weeks later)	1.35	5.4
Heavy >250 ADT[1]	1.35	1.35	2.7 (2 weeks later)	No mention of	5.4
Large trucks (dumps, semis)	5.4	none	2.7 (2-4 weeks later)	1.35	9.45
Notes: 1. Average daily traffic.					

These application rates are based on the recommended 5:1 water to Dust Bond diluted products.

Ponding should be avoided during application. Ponding will depend on several factors; the rate of Dust Bond discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care

should also be taken to ensure that the liquid is applied at or below the suggested rates. If ponding still occurs then a decrease in the application rate is necessary.

CURING TIME

Dust Bond does not have a curing time. It takes about 20 minutes to soak into the surface after which no other changes occur. Traffic should be restricted to slower speeds for 1/2 hour after spraying to permit maximum penetration and to avoid excessive tracking onto cars.

PROBLEMS AND HAZARDS

Roads may be slippery after periods of significant rainfall.

ffice 643-1135

DA-LEE DUST CONTROL
513125 ONTARIO LIMITED

MAILING ADDRESS
Box 14
Fruitland, Ont.
L0R 1L0

ATERIAL SAFETY DATA SHEET

ANUFACTURING FACILITY / DISTRIBUTOR : Da-Lee Dust Control
350 Jones Rd., P.O. Box 14,
Fruitland, Ont. L0R 1L0 (416) 643-1135

ATE OF PREPARATION: March 10, 1989

RODUCT NAME OR NUMBER: DUST BOND

WHMIS - Class D, Div 2

RODUCT USE: Dust suppression on roadways and parking lots

CTION II-HAZARDOUS INGREDIENTS

IEMICAL COMPONENTS	C.A.S.NUMBER	% WT.	EXPOSURE LIMITS
troleum Resin Distillate)	64742-04-7	60	5mg/m^3 (OHSA DEL)
ulsifier & Water		40	

CTION III - PHYSICAL DATA

HYSICAL STATE	Liquid
OILING POINT	212° F
APOUR PRESSURE (mmHg@20°C)	same as water
APOUR DENSITY (air=1)	same as water
OLUBILITY IN WATER	readily dispersible
PECIFIC GRAVITY	[redacted]1,
ERCENT VOLATILE BY VOLUME	less than 45°@ 25°C
VAPORATIVE RATE (ethyl ether=1)	same as water
H	4.5 to 6.5
REEZING POINT/MELTING POINT	minus 60°F
PPEARANCE AND ODOUR	light colour, no objectional odour
DOUR THRESHOLD (ppm)	not avail.
ENSITY (g/ml)	not avail.
OEFFICIENT OF OIL/WATER DIST.	not avail.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT	greater than 400°F
EXTINGUISHING MEDIA	Foam, dry chemical, water spray, CO_2
TDG FLAMMABILITY CLASS	not applic.
AUTOIGNITION TEMPERATURE	not avail.
UPPER EXPLOSION LIMIT	not avail.
LOWER EXPLOSION LIMIT	not avail.
SENSITIVITY TO MECHANICAL IMPACT	not applic.
SENSITIVITY TO STATIC DISCHARGE	not applic.
SPECIAL FIRE-FIGHTING INSTRUCTIONS	fire fighters should wear self-containe breathing apparatus.
SPECIAL PROCEDURES	- dense smoke, wear self-contained breathing apparatus - exposed material may be cooled with water, - water may cause frothing

SECTION V - REACTIVITY DATA

STABLE	not avail .
INCOMPATIBILITY (materials to avoid)	- avoid strong oxidizers such as hydrogenperoxide bromine and chromic acid
HAZARDOUS POLYMERIZATION	- not avail.
HAZARDOUS DECOMPOSITION PRODUCTS	- Carbon monoxide, Aldehydes and carbon dioxide from burning. Oxides of Nitrogen and sulfer may also be produced.

SECTION VI - TOXICOLOGICAL PROPERTIES

PRIMARY ROUTE (S) OF ENTRY	skin contact, Inhalation, ingestion, eyes
LD_{50}	greater than 16g/K (oral/rat)

EFFECTS OF EXPOSURE

Inhalation - Prolonged extreme exposure to high concentrations of mist may cause bronchial or lung irritation

Skin Contact - Prolonged skin contact may cause mild irritation and dermatitis.

Eye Contact - May cause mild irritation.

Ingestion - May cause irritation of the digestive tract.

CTION VII - FIRST AID MEASURES

HALATION - If a large amount of mist is inhaled, move exposed person to fresh air and call a physician.

IN - If skin becomes wet, wash exposed area with soap & Water.

ES - If eye contact occurs, flush eyes with water for 15 minutes.

GESTION - If swallowed, do not induce vomiting. Call physician immediately. Small amounts which accidentally enter mouth should be rinsed until taste of it is gone.

CTION VIII - PREVENTIVE MEASURES

GINEERING CONTROLS (eg. ventilation, enclosed process)

- Use local exhaust or dilution ventilation if exposures exceed permissible limit.

RSONAL PROTECTIVE EQUIPMENT

OVES - Impervious gloves recommended

ES - Chemical type goggles or face shield should be used as splashes to eye may occur

OTHING - Wash clothing before re-use

SPIRATORY PROTECTION - NIOSH approved if over exposure to mist occurs.

CTION IX - STORAGE AND HANDLING

ORAGE REQUIREMENTS - keep containers tightly closed

NDLING PROCEDURES AND EQUIPMENT - Avoid strong oxidizers.

- Avoid prolonged or repeated contact with skin or breathing vapours, mists or fumes.
- Launder contaminated clothing before re-use
- Wash thoroughly after handling.
- Do not use near sources of ignition such as flames or sparks.

CTION X - SPILL AND LEAK PROCEDURES

LEAN-UP - Absorb in vermiculite, dry sand, earth or similar material and dispose in secured sanitary landfill

ASTE DISPOSAL - Material is not classed as a hazardous waste

- Ministry of Environment waste class 252L if disposing of in liquid form.

DOT INFORMATION

Hazardous Material Proper Shipping Name	not applic.
Hazardous Class	not applic.
Identification Number	not applic.

WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH ON THIS DATA SHEET ARE BELIEVED TO BE ACCURATE AS OF THE PRESENT DATE, DA-LEE DUST CONTROL MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

PREPARED BY

Donna Didtrek
Administration
Da-Lee Dust Control
P.O. Box 14
Fruitland, Ont
L0R 1L0 (416) 643-1135

March 10, 1989

APPENDIX F.7

Line Wash Oil

PRODUCT APPLICATION SHEET FOR LINE WASH OIL

A. GENERAL INFORMATION

DESCRIPTION

High grade base stock oils produced by Ontario petroleum refineries are used as "line flush" or "line wash" oils, to clean out process lines after completed production runs. These line wash oils may also be used for dust suppression.

The following line wash oils were identified:

Dark Journal Oil (Petro Canada) - This is a double hydro treated base stock with various additives, yellow to amber in colour. It is a blend of many once through line wash oils. It is normally used in plain and antifriction bearings where lubrication is used for a short time.

COC-22 (Esso) - This is a solvent treated paraffinic base stock that has passed through the process lines more than once. It is dark brown in colour, and contains various additives. It is normally used in large lubricating systems and leaky hydraulic system for a short service life.

Faxam 22 (Esso) - Faxam 22 is not used as a line wash oil, but is included here because it is the same base stock as COC-22. It contains prescribed anti-rust and anti-oxidant additives so that it can be sold as a lubrication oil and hydraulic oil in large leaky systems.

Information on Dark Journal Oil from Petro Canada, as a representative line wash oil, was compiled for this review parameter list.

MANUFACTURERS AND DISTRIBUTORS

Petro Canada Inc. (Dark Journal Oil)
5140 Yonge Street, Suite 200
North York, Ontario
M2N 6L6

Telephone: (416) 730-2000
Contact: Glen Moore

Esso Petroleum Canada (COC-22 and Faxam-22)
55 St. Clair Avenue West
Toronto, Ontario
M5W 2J8

Telephone: (416) 498-2470
Contact: Charles Schwarztel

Other petroleum refineries in Ontario may also produce line wash oil. Line wash oils are distributed by the oil company.

APPLICATORS/CONTRACTORS

Two applicators of oil products in Ontario were identified during the study. The contact people for each manufacturer can also be contacted for other applicators.

The address for these two contractors are:

Da-Lee Dust Control
350 Jones Road
P.O. Box 14
Fruitland, Ontario
L0R 1L0

Telephone: (416) 643-1135
Contact: Donna Ditrek

NorJohn Ltd.
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Telephone: (416) 336-1216
Contact: Dave Bratley

B. HANDLING PROCEDURES

PERSONAL PROTECTION

The following procedures will ensure the safe handling of the line wash oils.

1. Operators should wear chemical goggles if splashing of oil is likely or a high-pressure system is in use.

2. Operators should wear Neoprene or Nitrile gloves under normal use if contact is likely.

3. Operators are not required to wear respiratory protection under normal operations. Operators should wear approved organic vapour respirators suitable for oil mist in areas with sufficient oxygen if mist is generated by heating or spraying.

4. Operators should wear long sleeved clothing to minimize skin contact.

EMERGENCY FIRST AID

First aid procedures are listed in the attached Material Safety Data Sheet for Dark Journal Oil.

TRANSPORTATION AND SHIPPING REQUIREMENTS

No special precautions other than those normally employed in the transportation of industrial hydrocarbon liquids are necessary.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application rate, into the natural environment. This can be caused by spray bars left on after operation, tank rupture, tank turn over, etc. In the event of a spill the following procedures are recommended:

1. The spill should be contained using sand or earth to prevent line wash oils from entering water ways or low areas. All sources of ignition must be removed.

2. As much as possible of the spilled oil should be recovered with pumping equipment or absorbent material.

3. The remaining spilled oil should be absorbed with sand, or diatomaceous earth or commercial solvents.

4. The following should be contacted:

   - All local municipal authorities.

   - The Spills Action Centre, at 1-800-268-6060.

- Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular).

- The applicator.

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants, product dust suppressants should not be applied to sites closely adjacent to or crossing waterway(s) or marshes, or near wells.

SURFACE PREPARATION

Surface preparation usually consists of no more than grading to remove potholes and corrugations. A general preparation for the road surface is as follows:

1. Proper drainage should be provided on both sides of the road.

2. The surface should be graded to a significant depth (20 to 50 mm) to remove pot holes, corrugations and other ruts. If the road is deeply rutted or corrugated it may require scarification between 25 and 100 mm.

3. Gravel or fines should be added as required to yield a final composition of up to 8 percent fines (<200 mesh).

4. Oils should be applied at desired levels while the surface still retains some moisture (this aids in wetting of the particle surfaces and helps prevent dust pockets from forming).

5. Compaction of the surface is suggested to provide a firm solid base, particularly if the surface is being newly constructed.

APPLICATION EQUIPMENT

Application equipment for virgin oils is usually a bituminous distributor. The Ontario Ministry of Transportation requires that the distributor be equipped with a pump capable of delivering a constant uniform pressure in the spray bar manifold. In addition, the spray bar must be capable of application over a variety of widths. The distributor tank should also come equipped with a dip stick for measuring quantities applied.

A general equipment list for bituminous distributors includes the following features:

- Recirculation in the tank.
- A quick opening gate in the dome.
- An external readily visible tank gauge.
- Rear mounted spray bars and nozzles 0.6 to 3.6 m wide capable of:
  - vertical and lateral adjustment
  - producing double coverage in one pass.
- Spray bars that do not extend into the lane of opposing traffic unless adequate warning measures are taken.
- The feed to the spray bars equipped with:
  - recirculation before and during operation and
  - filters.
- Spray nozzles:
  - fitted with instant on/off valves and
  - which yield fan-shaped sprays without atomization.
- A pressure pump capable of supplying approximately 726 L/min of oil.
- An operator visible 345 MPa pressure gauge.
- An operator visible flow meter.
- An operator visible pump tachometer.

PERSONNEL REQUIREMENTS

Typically two to four people are required for safe application of dust suppressants. This would consist of at least one, maybe two, flag-persons and/or an operator of a warning pilot vehicle, the operator of the application truck, and an application checker (the flag person can double as a checker).

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Application of oils should be made no sooner than 6 to 12 hours after a significant rainfall, but while the soil still retains some moisture. This will prevent dust beads from forming, which would prevent wetting of the soil aggregate by the oil. In addition, application should not be made within 6 hours of expected rainfall to permit complete

saturation, penetration, and absorption of the oil into the road surface, and to prevent it from leaching and running off.

DILUTION

Line wash oils are not diluted for application. Oils should not be mixed with anything other than other virgin hydrocarbon base oils for the purpose of thinning. Strong oxidizing agents should be particularly avoided.

APPLICATION FREQUENCY AND RATE

Virgin oils are usually applied once per season in Ontario at both municipal road and industrial sites (CH2M HILL, 1991). Some very heavy industrial locations may apply twice per season. According to a survey of various highway agencies in Canada and the U.S. (Public Works Canada, 1983), application of oil products ranges from two light applications per year of about 0.8 to 1.7 L/m^2 to one heavy application in Alberta of about 2.5 to 3.0 L/m^2 every two to three years. Ontario industrial application rates vary from 0.3 L/m^2 to 1.9 L/m^2, and municipal application rates are from 1.1 to 1.3 L/m^2. Subsequent applications, if made, are at the same rates as initial applications.

Ponding should be avoided during application. Ponding will depend on several factors: the rate of oil discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care should also be exercised to ensure that the oil is applied at or below the suggested rates. If ponding still occurs, then a decrease in the application rate is recommended.

CURING TIME

There is no curing time associated with the line wash oils. They remain in the viscous liquid state. Traffic can be permitted immediately following application, but 1/2 hour of slowed traffic is recommended to permit adequate penetration.

PROBLEMS AND HAZARDS

Driving over freshly applied oil may cause splashing onto cars. Heavy rains on roads with high clay content treated with oil may cause slippery conditions (the oil acts as a lubricant between clay particles).

MATERIAL SAFETY DATA SHEET

PETRO-CANADA

WHMIS CLASSIFICATION

Not Controlled

PRODUCT CODE: 490- 464, 472

DATE: February 15, 1991

SECTION I MATERIAL IDENTIFICATION

Trade Name:	DARK JOURNAL OIL S, E
Other Names:	None
Chemical Synonyms and Family:	Petroleum Hydrocarbon
Name of Manufacturer/Supplier Address & Emergency Phone Number:	Petro-Canada Inc. (403) 296-3000 P.O. Box 2844, Petro-Canada Centre Calgary, Alberta T2P 3E3
Poison Control Centre Numbers:	Consult local telephone directory for emergency numbers.
Application:	Dark Journal Oils are process oils used as 'once-through' lubricating oils for use in plain and antifriction bearings where lubricant is used for a short time.

SECTION II TRANSPORTATION

UN Number: NR Primary Classification: NR Subsiduary Classification: NR

Compatibility Groups: NR CANUTEC Transport Emergency No. (613) 996-6666

SECTION III COMPOSITION

COMPONENTS	ALLOWABLE LIMITS (8 HR.)	% (VOL.)	CAS #
Severely hydrotreated paraffinic and solvent refined heavy naphthenic oils. (C_{20} - C_{66})	5 mg/m^3 (oil mist)	90-95	72623-86-0 72623-84-8 72623-87-1 72623-85-9 64741-96-4
Viscosity index improver defoamer, rust inhibitor, antioxidant, pour point depressant, organo-zinc additive*	N/A	5-10	N/A

* Contains zinc dialkyldithiophosphate (<0.07 % as Zn)

NR-Not Regulated N/A-Not Applicable U-Unknown

Cette fiche est aussi disponible en français.

Trade Name: DARK JOURNAL OIL S, E

SECTION IV — PHYSICAL DATA

Density: (@15°C)	0..84 to 0.89 kg/L (approx.)	Boiling Point/Range: (@ 1 atm)	>316 °C (approx.)
Vapour Pressure: (@ 25°C)	<0.001 kPa	Percent Volatile: (@ 20°C)	0%
Vapour Density: (@ 20°C)	N/A	Evaporation Rate:	N/A
Solubility in Water:	Negligible		
Viscosity (Kinematic): @ 40°C	20-160 cSt		
Pour Point.	30 to 43°C	Appearance: & Odour	Yellow to dark amber viscous liquid with hydrocarbon odour.

SECTION V — FIRE & EXPLOSION DATA

Flash Point (method used- COC):	> 195°C
Flammable limits in air (% by volume):	Unknown
Auto-ignition Temperature:	> 235°C
Fire and Explosion Hazards: LOW FIRE HAZARD	Addition of water or foam may cause frothing. Do not cut, drill or weld empty containers.
Extinguishing Media:	Dry chemical or carbon dioxide for small fires. Water spray or foam for large fires.
Fire Fighting Procedures:	Contain spill. Cover with extinguishing agent. Use water spray to cool fire-exposed containers and as a protective screen. Do not point solid water stream directly into burning oil to avoid spreading. Wear self-contained breathing apparatus when fighting in confined areas.

SECTION VI — HEALTH HAZARD INFORMATION

Toxicity Data	*Estimated acute LD_{50} > 5000 mg/kg (rat, oral): practically non-toxic. Severely hydrotreated and propane-deasphalted residual oils are negative when tested by the modified Ames test.
Effects of Overexposure	
Inhalation:	If sprayed or misted may cause chemical pneumonitis.
Skin and Eyes:	Mildly irritate to eyes. Prolonged or repeated contact with skin may cause irritation and possibly dermatitis.
Ingestion:	Low toxicity on ingestion. Has laxative effect.

* Based on toxicity of severely hydrotreated paraffinic oil only.

Trade Name: DARK JOURNAL OIL S, E

Emergency and First Aid Procedures Information

Skin: Remove contaminated clothing - launder before reuse. Soap and water wash. Discard saturated leather articles.

Eyes: Copious warm water flush - 15 minutes. Physician assessment if eyes inflamed.

Inhalation: Evacuate to fresh air. Apply Cardio Pulmonary Resuscitation if required. Administer oxygen if available. If resuscitation is required, physician assessment is mandatory.

Ingestion: DO NOT INDUCE VOMITING. Force fluids. Activated charcoal tablets.

Notes to Physician: Gastric lavage should only be done after endotracheal intubation in view of the risk of aspiration which can cause serious chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.

SECTION VII — REACTIVITY DATA

Stability:	Stable.
Conditions to avoid:	Excessive heat, formation of oil mist.
Materials to avoid:	Strong oxidizing agents (peroxides, chlorine, strong acids, etc.).
Hazardous Decomposition products:	COx, SOx, oxides of zinc, phosphorus and calcium, smoke on combustion.
Can hazardous polymerization occur?:	No.

SECTION VIII — SPILL OR LEAK PROCEDURES

Steps to be taken if material is released or spilled:	Contain spill. Absorb with inert absorbent such as dry clay, sand or diatomaceous earth, commercial sorbents, or recover using pumps. Scoop up used absorbent and rags into drums.
Waste Disposal Method:	Dispose in approved, SECURE landfill site or licensed waste reclaimer facility.

N/A-Not Applicable U-Unknown

SECTION IX SPECIAL PROTECTION INFORMATION

Ventilation:	General ventilation.
Respiratory Protection:	Normally not necessary. If mist generated by heating, spraying, etc. wear approved organic vapour respirator suitable for oil mist in areas with sufficient oxygen.
Protective Gloves:	For direct contact with hydrocarbons of more than two hours, NITRILE or VITON recommended. Otherwise, PVC gloves may be worn.
Eye Protection:	None normally required: chemical goggles if splashing likely or high-pressure systems used.
Other Protective Clothing:	Wear long sleeved clothing to minimize skin contact.

SECTION X SPECIAL PRECAUTIONS

Store in cool, well-ventilated area. Wash hands after handling and before eating. Avoid inhalation and skin contact. Launder work clothes frequently. Discard saturated leather goods.

SECTION XI REFERENCES

ACGIH. Threshold Limit Values and Biological Exposure Indices for 1989-90.
CONCAWE. First Aid Measures, Medical Toxicology Data and Professional Advice to Clinicians on Petroleum Products. Feburary 1983.
API. Petroleum Process Stream Terms Included in the Chemical Substances Inventory Under the Toxic Substances Control Act (TSCA), 1983.
API. Acute Toxicity Tests - Paraffinic Oil. API Study 78-9, 78-10, 79-4, 79-1.
NIOSH. The Industrial Environment - Its Evaluation and Control. 1973.
Petro-Canada Inc., Petro-Canada Report on Modified Ames Tests of Petroleum Basestocks. 1986.

Petro-Canada and its affiliates assume no responsibility for injury to anyone caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Petro-Canada Inc. and its affiliates assume no responsibility for injury to anyone caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee and third persons assume the risk in their use of the material.

Petro-Canada Inc.

APPENDIX F.8

Coke Wash Oil

PRODUCT APPLICATION SHEET FOR COKE WASH OIL

A. GENERAL INFORMATION

DESCRIPTION

Coke wash oil is manufactured by several Ontario petroleum refineries. The information in this report has been based on Petro Canada's Wash Oil A.

Coke wash oil from Petro Canada, known as Wash Oil A is a virgin, light fraction of hydro treated crude oil that is clear in colour and has a slight hydrocarbon odour. It contains no additives, metals, nitrogen or sulphur compounds. It is normally used for washing coke in the refinery process, spraying coke piles in the iron and steel industry for dust suppression, absorbing coke oven gases, dedusting potash, and defoaming paper pulp. It is also used for dust suppression of road and yard surfaces, and shoulders. The manufacturing process may differ slightly at other oil companies who manufacture coke wash oil.

MANUFACTURER AND SUPPLIER

Coke wash oil is manufactured and supplied by the oil company. Other petroleum refineries may also be contacted for information.

Petro Canada Inc.
5140 Yonge Street
Suite 200
North York, Ontario
M2N 6L6

Telephone: (416) 730-2000
Contact: Mr. Glen Moore

APPLICATORS/CONTRACTORS

Petro Canada identified only one contractor in Ontario who applies Wash Oil A. This contractor is:

NorJohn Ltd.
P.O. Box 100
Thorold, Ontario
L2V 3Y8

Telephone: (416) 356-7222
Contact: Mr. Dave Bratley

Other contractors in Ontario may apply coke wash oil.

B. HANDLING PROCEDURES

PERSONAL PROTECTION

The following protective measures suggested by Petro Canada will minimize the risk of personal injury when handling Wash Oil A.

1. Operators should wear chemical goggles if splashing of oil is likely or a high-pressure system is in use.

2. Operators should wear PVC gloves under normal use if contact is likely. If prolonged contact of 2 or more hours is likely, then VITON or NITRILE gloves are recommended.

3. Operators are not required to wear respiratory protection under normal operations. Operators should wear approved organic vapour respirators suitable for oil mist in areas with sufficient oxygen if mist is generated by heating or spraying.

4. Operators should wear long sleeved clothing to minimize skin contact.

EMERGENCY FIRST AID

Emergency first aid treatment is outlined in the attached Material Safety Data Sheet for Wash Oil A.

TRANSPORTATION AND SHIPPING REQUIREMENTS

No special precautions, other than those normally employed in the transportation of industrial hydrocarbon liquids, are necessary.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application rate into the natural environment. This can be caused by spray bars left on after operation, tank rupture, tank over turn,

etc. In the event of a spill the following procedures are recommended by Petro Canada for Wash Oil A:

1. The spill should be contained using sand or earth to prevent from entering water courses or low areas. All sources of ignition must be removed.

2. As much as possible of the oil should be recovered with pumping equipment or absorbent material.

3. The remaining spilled oil should be absorbed with sand, diatomaceous earth, or commercial sorbets.

4. The following should be contacted:

   - All local municipal authorities.
   - The MOE's Spills Action Centre, at 1-800-268-6060.
   - Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular).
   - The applicator.

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressant, dust suppressants should not be applied to sites closely adjacent to or crossing waterway(s) or marshes, or near wells.

PREPARATION

Surface preparation usually consists of no more than grading to remove potholes and corrugations. A general preparation of the road surface for dust suppressant application is as follows:

1. Proper drainage should be provided on both sides of the road.

2. The surface should be graded to a significant depth (20 to 50 mm) to remove pot holes, corrugations and other ruts. If the road is deeply rutted or corrugated it may require scarification between 25 and 100 mm.

3. Gravel or fines should be added as required to yield a final composition of up to 8 percent fines (<200 mesh).

4. Virgin oil should be applied at desired levels while the surface still retains some moisture (this aids in wetting of the particle surfaces and helps prevent dust pockets from forming).

5. Compaction of the surface is suggested to provide a firm solid base, particularly if the surface is being newly constructed.

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Application of oils should be made no sooner than 6 to 12 hours after a significant rainfall, but while the soil still retains some moisture. This will prevent dust beads from forming, which prevent wetting of the soil aggregate by the oil. In addition, application should not be made within 6 hours of expected rainfall to permit complete saturation, penetration, and sorption of the oil into the road surface. If heavy rains are expected, oil should not be applied until afterward to prevent leaching and runoff.

APPLICATION EQUIPMENT

Application equipment for virgin oils is usually a bituminous distributor. The Ontario Ministry of Transportation requires that the distributor be equipped with a pump capable of developing a constant uniform pressure in the spray bar manifold. In addition, the spray bar must be capable of application over a variety of widths. The distributor tank should also come equipped with a dip stick for measuring quantities applied.

A general equipment list for bituminous distributors includes the following items:

- Recirculation in the tank.
- A quick opening gate in the dome.
- An external readily visible tank gauge.
- Rear mounted spray bars and nozzles 0.6 to 3.6 m wide capable of:
  - vertical and lateral adjustment
  - producing double coverage in one pass.
- Spray bars that do not extend into the lane of opposing traffic unless adequate warning measures are taken.

- The feed to the spray bars equipped with:
  - recirculation before and during operation
  - filters.

- Spray nozzles:
  - fitted with instant on/off valves, and,
  - which yield fan-shaped sprays without atomization.

- A pressure pump capable of supplying approximately 726 L/min of oil.

- An operator visible 345 MPa pressure gauge.

- An operator visible flow meter.

- An operator visible pump tachometer.

PERSONNEL REQUIREMENTS

Typically two to four people are required for safe application of dust suppressants. This would consist of at least one, maybe two, flag-persons and/or an operator of a warning pilot vehicle, the operator of the application truck, and an application checker (the flag person can double as a checker).

DILUTION/MIXING RESTRICTIONS

Wash Oil A is not normally diluted for application. Virgin oils should not be mixed with anything other than other virgin hydrocarbon base oils for the purpose of thinning. Strong oxidizing agents should be particularly avoided.

APPLICATION FREQUENCY AND RATE

Virgin oils are usually applied once per season for both municipal road and industrial site locations. Some very heavy industrial locations may require a second application per season. According to a survey of various highway agencies in Canada and the U.S. (Public Works Canada, 1983), application of oil products ranges from two light applications per year of about 0.8 to 1.7 L/m^2 to one heavy application of about 2.5 to 3.0 L/m^2 every two to three years. Ontario industrial application rates vary from 0.3 L/m^2 to 1.9 L/m^2, and municipal application rates reported are from 1.1 to 1.3 L/m^2. Subsequent applications, if made, are at the same rates as initial applications.

Ponding should be avoided during application. Ponding will depend on several factors: the rate of oil discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the

vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care should also be exercised to ensure that the oil is applied at or below the suggested rates. If ponding still occurs, then a decrease in the application rate is necessary.

CURING TIME

There is no curing time associated with Wash Oil A. It remains in the viscous liquid state. Traffic can be permitted on immediately following application, but 1/2 hour of slowed traffic is recommended to permit adequate penetration.

PROBLEMS AND HAZARDS

Driving over freshly applied oil may cause splashing onto cars. Heavy rains on high clay content roads treated with oil may cause slippery conditions (the oil acts as a lubricant between clay particles).

MATERIAL SAFETY DATA SHEET

WHMIS CLASSIFICATION

Not Controlled

PRODUCT CODE: 490-345

DATE: February 15, 1991

SECTION I MATERIAL IDENTIFICATION

Trade Name:	WASH OIL A
Other Names:	None
Chemical Synonyms and Family:	Petroleum hydrocarbon.
Name of Manufacturer/Supplier Address & Emergency Phone Number:	Petro-Canada Inc. (403) 296-3000 P.O. Box 2844, Petro-Canada Centre Calgary, Alberta T2P 3E3
Poison Control Centre Numbers:	Consult local telephone directory for emergency numbers.
Application:	Wash Oil A is a process oil used for a variety of applications such as absorbing coke oven gases, dedusting potash, and defoaming paper pulp, etc.

SECTION II TRANSPORTATION

UN Number: NR Primary Classification: NR Subsiduary Classification: NR

Compatibility Groups: NR CANUTEC Transport Emergency No. (613) 996-6666

SECTION III COMPOSITION

COMPONENTS	ALLOWABLE LIMITS (8 HR.)	% (VOL.)	CAS #
Complex mixture of aromatic/aliphatic hydrocarbons* (C_{16} - C_{21})	5 mg/m^3 (oil mist)	100	64742-46-7

* Contains total aromatics 3.9% (benzene - nil).

NR-Not Regulated N/A-Not Applicable U-Unknown

Cette fiche est aussi disponible en français.

SECTION IV PHYSICAL DATA

ensity: (@ 15°C	0.87 kg/L	Boiling Point/Range: (@ 1 atm)	285-350°C
Vapour Pressure: (@ 25°C	< 0.01 kPa (estimated)	Percent Volatile: (@ 20°C	0%
Vapour Density: (@ 20°C	N/A	Evaporation Rate:	N/A
Solubility in Water:	Negligible		
Viscosity (Kinematic): (@ 40°C	4.0-7.0 cSt (typical)		
Pour Point:	- 24°C	Appearance: & Odour	Colorless to light yellow viscous liquid with hydrocarbon odour.

SECTION V FIRE & EXPLOSION DATA

Flash Point (method used- COC):	125°C (minimum); 137°C (typical)
Flammable limits in air (% by volume):	N/A
Auto-Ignition Temperature:	235°C
Fire and Explosion Hazards: LOW FIRE HAZARD	Addition of water or foam may cause frothing. Do not cut, drill or weld empty containers.
Extinguishing Media:	Dry chemical or carbon dioxide for small fires. Water spray or foam for large fires.
Fire Fighting Procedures:	Contain spill. Cover with extinguishing agent. Use water spray to cool fire-exposed containers and as a protective screen. Do not point solid water stream directly into burning oil to avoid spreading.

SECTION VI HEALTH HAZARD INFORMATION

Toxicity Data	Wash Oil A is negative when tested by the modified Ames test.
Effects of Overexposure	
Inhalation:	If sprayed or misted may cause chemical pneumonitis.
Skin and Eyes:	Mildly irritating to eyes. Prolonged or repeated contact with skin may cause mild irritation and possibly dermatitis.
Ingestion:	Low toxicity on ingestion. Has laxative effect.

Trade Name: WASH OIL A

Emergency and First Aid Procedures Information

Skin: Remove contaminated clothing - launder before reuse. Soap and water wash. Discard saturated leather articles.

Eyes: Copious warm water flush - 15 minutes. Physician assessment if eyes inflamed.

Inhalation: Evacuate to fresh air. Apply Cardio Pulmonary Resuscitation if required. Administer oxygen if available. If resuscitation is required, physician assessment mandatory.

Ingestion: DO NOT INDUCE VOMITING. Force fluids. Activated charcoal tablets.

Notes to Physician Gastric lavage should only be done after endotracheal intubation in view of the risk of aspiration which can cause serious chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.

SECTION VII — REACTIVITY DATA

Stability:	Stable.
Conditions to avoid:	Excessive heat, formation of oil mist.
Materials to avoid:	Strong oxidizing agents (peroxides, chlorine, strong acids, etc.).
Hazardous Decomposition products:	CO_x, smoke on combustion.
Can hazardous polymerization occur?:	No.

SECTION VIII — SPILL OR LEAK PROCEDURES

Steps to be taken if material is released or spilled:	Contain spill. Absorb with inert absorbent such as dry clay, sand or diatomaceous earth, commercial sorbents, or recover using pumps. Scoop up used absorbent into drums.
Waste Disposal Method:	Dispose in approved, SECURE landfill site or licensed waste reclaimer facility.

N/A-Not Applicable U-Unknown

SECTION IX SPECIAL PROTECTION INFORMATION

Ventilation:	General ventilation.
Respiratory Protection:	Normally not necessary. If mist generated by heating, spraying, etc. wear approved organic vapour respirator suitable for oil mist in areas with sufficient oxygen.
Protective Gloves:	For direct contact with hydrocarbons of more than 2 hours, VITON or NITRILE recommended. Otherwise PVC gloves may be worn.
Eye Protection:	None normally required; chemical goggles if splashing likely or high-pressure system used.
Other Protective Clothing:	Wear long sleeved clothing to minimize skin contact.

SECTION X SPECIAL PRECAUTIONS

Store in cool, well-ventilated area. Wash hands after handling and before eating. Avoid inhalation and skin contact. Launder work clothes frequently. Discard saturated leather goods.

SECTION XI REFERENCES

ACGIH. Threshold Limit Values and Biological Exposure Indices for 1989-90.
CONCAWE. First Aid Measures, Medical Toxicology Data and Professional Advice to Clinicians on Petroleum Products. February 1983.
API. Petroleum Process Stream Terms Included in the Chemical Substances Inventory Under the Toxic Substances Control Act (TSCA). 1983.
NIOSH. The Industial Environment - Its Evaluation and Control. 1973.
Petro-Canada Inc., Petro-Canada Report on Modified Ames Tests of Petroleum Basestocks, 1986.

Petro-Canada and its affiliates assume no responsibility for injury to anyone caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Petro-Canada Inc. and its affiliates assume no responsibility for injury to anyone caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee and third persons assume the risk in their use of the material.

Petro-Canada Inc.

APPENDIX F.9

Bunker Fuel Oil

PRODUCT APPLICATION SHEET FOR BUNKER FUEL OIL

A. GENERAL INFORMATION

DESCRIPTION

Bunker fuel is available from most petroleum refineries in Ontario. However, at the time of this study, no Ontario companies were identified who supply bunker fuel as a dust suppressant.

Bunker fuel is a residual fuel that is normally burned as a fuel oil for heating purposes. It may contain asphaltines, cracked olefinic compounds and metals such as nickel, vanadium and cadmium. It is characterized as a black, very viscous liquid with a definite hydrocarbon smell accompanied by a slight rotten egg odour.

MANUFACTURERS AND DISTRIBUTORS

Petro Canada Inc.
5140 Yonge St.
Suite 200
North York, Ontario
M2N 6L6

Telephone: (416) 730-2000
Contact: Mr. Glen Moore

Esso Petroleum Canada
55 St. Clair Avenue West
Toronto, Ontario
M5W 2J8

Telephone: (416) 498-2470
Contact: Mr. Charles Schwartzel

Shell Canada Products Ltd.
Shell Place
75 Wynford Dr.
Don Mills, Ontario
M3C 2Z4

Telephone: (416) 443-7099
Contact: Mr. Kirt McNaughton

Bunker fuel oil may also be available from other Ontario petroleum companies.

APPLICATORS/CONTRACTORS

At the time of this study, applicators who currently apply bunker fuel as a road dust suppressant were not identified. However, Keith Thompson Ltd. in Sudbury did apply bunker fuel mixed with diesel fuel as a dust suppressant over 15 years ago.

B. HANDLING PROCEDURES

PERSONAL PROTECTION

The following protective measures will minimize the risk of personal injury when handling bunker fuel oil:

1. Operators should wear chemical goggles if splashing of oil is likely or a high-pressure system is in use.

2. Operators should wear PVC gloves under normal use if contact is likely. If prolonged contact of 2 or more hours is likely, then Viton or Nitrile gloves are recommended.

3. Operators are not required to wear respiratory protection under normal operations. Operators should wear approved organic vapour respirators suitable for oil mist in areas with sufficient oxygen, if mist is generated by heating or spraying.

4. Operators should wear long sleeved clothing to minimize skin contact.

EMERGENCY FIRST AID

First aid procedures are outlined in the attached Material Safety Data Sheet for Heavy Fuel Oil (Petro Canada, 1990).

TRANSPORTATION & SHIPPING

Transportation of bunker fuel for road oiling is generally made at elevated temperatures, near 60 °C, to maintain an acceptable viscosity for application spraying. No special precautions other than those necessary for transportation of heated industrial hydrocarbon products is required.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application rate into the natural environment. This can be caused by spray bars left on after operation, tank rupture, tank over turn, etc. In the event of a spill the following procedures are recommended:

1. The spill should be contained using sand or earth to prevent oil entering water ways or low areas. All sources of ignition must be removed.

2. As much of the oil as possible should be recovered with pumping equipment or absorbent material.

3. The remaining spilled oil should be absorbed with sand, diatomaceous earth, or commercial solvents.

4. The following should be contacted:

   - All local municipal authorities,
   - MOE's Spills Action Centre, at 1-800-268-6060,
   - Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular).
   - The supplier and applicator of the oil.

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants, dust suppressants should not be applied to sites closely adjacent to, or crossing, waterway(s) or marshes, or near wells.

PREPARATION

Surface preparation usually consists of no more than grading to remove potholes and corrugations. However, a general preparation for the road surface to ensure proper application is as follows:

1. Proper drainage should be provided on both sides of the road.

2. The surface should be graded to a significant depth (20 to 50 mm) to remove pot holes, corrugations and other ruts. If the road is deeply rutted or corrugated it may require scarification between 25 and 100 mm.

3. Gravel or fines should be added as required to yield a final composition of up to 8 percent fines (<200 mesh) (UMA Engineering Ltd., 1987).

4. Oil should be applied at desired levels while the surface still retains some moisture (this aids in wetting of the particle surfaces and helps prevent dust pockets from forming).

5. Compaction of the surface is suggested to provide a firm solid base, particularly if the surface is being newly constructed.

APPLICATION EQUIPMENT

Application equipment for virgin oils is usually a bituminous distributor. The Ontario Ministry of Transportation requires that the distributor be equipped with a pump capable of developing a constant uniform pressure in the spray bar manifold. In addition, the spray bar must be capable of application over a variety of widths. The distributor tank should also come equipped with a dip stick for measuring quantities applied.

A general equipment list for bituminous distributors contains the following:

- Recirculation in the tank.
- A quick opening gate in the dome.
- An external readily visible tank gauge.
- Rear mounted spray bars and nozzles 0.6 to 3.6 m wide capable of:
  - vertical and lateral adjustment
  - producing double coverage in one pass.
- Spray bars that do not extend into the lane of opposing traffic unless adequate warning measures are taken.
- The feed to the spray bars equipped with:
  - recirculation before and during operation
  - filters.
- Spray nozzles:
  - fitted with instant on/off valves, and,
  - which yield fan-shaped sprays without atomization.

- A pressure pump capable of supplying approximately 726 L/min of oil.
- An operator visible 345 MPa pressure gauge.
- An operator visible flow meter.
- An operator visible pump tachometer.

PERSONNEL REQUIREMENTS

Typically two to four people are required for safe application of dust suppressants. This would consists of at least one, maybe two, flag-persons and/or an operator of a warning pilot vehicle, the operator of the application truck, and an application checker (the flag person can double as a checker).

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Application of bunker fuel should be made no sooner than 6 to 12 hours after a significant rainfall, but while the soil still retains some moisture. This will prevent dust beads from forming, thereby prevent wetting of the soil aggregate by the oil. In addition, application should not be made within 6 hours of expected rainfall to permit complete saturation, penetration, and sorption of the oil into the road surface, and to prevent its leaching and running off.

DILUTION

Bunker fuel used for road oiling has previously been mixed with diesel fuel at a 60 to 40, bunker fuel to diesel ratio. A final temperature of approximately 60 °C maintains a viscosity acceptable for spraying.

Virgin oils should not be mixed with anything other than other virgin hydrocarbon base oils for the purpose of thinning. Strong oxidizing agents should be avoided since these will react with oils.

APPLICATION FREQUENCY AND RATE

An application rate of bunker fuel is not available since current applicators of this product were not identified. However, virgin oils are usually applied once per season for both municipal road and industrial site locations. Some very heavy industrial locations may apply twice per season. According to a survey of various highway agencies in Canada and the U.S., application of oil products ranges from two light applications per year, of about 0.8 to 1.7 L/m^2 to one heavy application in Alberta, of about 2.5 to 3.0

L/m^2 every two to three years. Ontario industrial application rates vary from 0.3 L/m^2 to 1.9 L/m^2, and municipal application rates are from 1.1 to 1.3 L/m^2. Subsequent applications, if made, are at the same rates as initial applications.

Ponding should be avoided during application. Ponding will depend on several factors: the rate of bunker fuel discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care should also be exercised to ensure that the oil is applied at or below the suggested rates. If ponding still occurs, then a decrease in the application rate is necessary.

CURING TIME

The curing time required for bunker fuel applications sufficient to evaporate the diesel fuel is about 24 hours.

PROBLEMS AND HAZARDS

Driving over freshly applied oil may cause splashing onto cars. Heavy rains on high clay content roads treated with oil may cause slippery conditions (the oil acts as a lubricant between clay particles).

MATERIAL SAFETY DATA SHEET

WHMIS CLASSIFICATION

Combustible Liquid (Class B3)
Poisonous Material (Class D2)

PRODUCT CODE: 410, 420, 430, 440, 441, 442, 443, 445

DATE: February 1, 1990

SECTION I — MATERIAL IDENTIFICATION

Trade Name:	HEAVY FUEL OIL
Other Names:	Heavy Fuel Oil 4, 5, 6A, 6C-1.5%, 1.7%, 2.5%, 3.0% S; 806
Chemical Synonyms and Family:	Petroleum hydrocarbon
Name of Manufacturer/Supplier Address & Emergency Phone Number:	Petro-Canada Inc. (403) 296-3000 P.O. Box 2844, Petro-Canada Centre Calgary, Alberta T2P 3L3
Poison Control Centre Numbers:	Consult local telephone directory for emergency numbers.
Application:	Heavy Fuel Oil is used in industrial heating equipment equipped with pre-heaters.

SECTION II — TRANSPORTATION

UN Number: 1202 Primary Classification: NR* Subsidiary Classification: NR

Compatibility Groups: NR CANUTEC Transport Emergency No. (613) 996-6666

SECTION III — COMPOSITION

COMPONENTS	ALLOWABLE LIMITS (ACGIH)	% (VOL.)	CAS #
Complex mixture of aromatic/aliphatic hydrocarbons (C_9 - C_{50})	nonestablished	≥97	64741-62-4 64741-89-9 68814-87-9 68334-30-5 68955-27-1
Sulphur		≤3	7704-34-9

*All Heavy Fuel Oil 4 and Heavy Fuel Oil 5 from Lake Ontario Refinery, Oakville have a Primary TDG Classification of 3.3.

NR-Not Regulated N/A-Not Applicable U-Unknown

Cette fiche est aussi disponible en français.

Skin: For hot fuel oil splash, cool affected area with water immersion or shower. Remove contaminated clothing - launder before reuse. Soap and water wash. Discard saturated leather articles. Physician assessment if redness or irritation occurs.

Eyes: copious warm water flush - 15 minutes. Physician assessment if eyes inflamed.

Inhalation: Evacuate to fresh air. Apply Cardio Pulmonary Resuscitation if required. Administer oxygen if available. If resuscitation is required, physician assessment is mandatory.

Ingestion: DO NOT INDUCE VOMITING. Force fluids. Activate charcoal tablets. Physician assessment mandatory.

Notes to Physician: The ingestion of heavy fuel oil is an unlikely event. No specific therapy is indicated. Treat with supportive measures as appropriate to the patient's condition.

SECTION VII — REACTIVITY DATA

Stability:	Stable.
Conditions to avoid:	Excessive heat.
Materials to avoid:	Strong oxidizing agents (peroxides, chlorine, strong acids, etc.).
Hazardous Decomposition products:	CO_x, SO_x, NO_x, smoke on combustion.
Can hazardous polymerization occur?:	No.

SECTION VIII — SPILL OR LEAK PROCEDURES

Steps to be taken if material is released or spilled:	Contain spill. Absorb with inert absorbent such as dry clay, sand or diatomaceous earth, commercial sorbents, or recover using pumps. Scoop up used absorbent into drums.
Waste Disposal Method:	Dispose in approved, SECURE landfill site or licenced waste reclaimer facility.

SECTION IV — PHYSICAL DATA

Density (@ 15°C)	0.99-1.0 kg/L	Boiling Point/Range: (@ 1 atm)	N/A
Vapour Pressure: (@ 25°C)	0.7 kPa	Percent Volatile: (@ 20°C)	0%
Vapour Density: (@ 20°C)	Unknown	Evaporation Rate:	N/A
Solubility in Water:	Negligible		
Viscosity (Kinematic): (@ 80°C)	9-80 cSt (Fuel Oil 4.5) 80-638 cSt (all others) 6.8		
Pour Point:	-18 to +27°C	Appearance & Odour:	Black viscous liquid with tarry hydrocarbon odour.

SECTION V — FIRE & EXPLOSION DATA

Flash Point (method used: COC):	All Heavy Fuel 4 and Heavy Fuel Oil 5 from LOR, Oakville - 84°C min. Others - 62°C min.
Flammable limits in air (% by volume):	N/A
Auto-Ignition Temperature:	Unknown
Fire and Explosion Hazards: MODERATE FIRE HAZARD	Addition of water or foam may cause frothing. Do not cut, drill or weld empty containers.
Extinguishing Media:	Foam, dry chemical, water spray, carbon dioxide for small fires.
Fire Fighting Procedures:	Contain spill. Cover with extinguishing agent. Use water spray to cool fire-exposed containers and as a protective screen. Do not point solid water stream directly into burning oil to avoid spreading.

SECTION VI — HEALTH HAZARD INFORMATION

Toxicity Data

Acute LC_{50} > 4600 mg/kg (rat, oral): slightly toxic.
Rabbit primary dermal irritation index = 0.7: slightly irritating.
Rabbit eye irritation index = 7.3: mildly irritating.
Heavy Fuel Oil contains polycyclic aromatic hydrocarbons of which several have been identified as carcinogenic to experimental animals.

Effects of Overexposure:

Inhalation: Due to low volatility, inhalation not likely

Skin and Eyes: Could cause irritation to eyes. Prolonged or repeated contact with skin may cause dermatitis or warty skin growths (keratosis). These growths may become malignant. Hot fuel oil burns skin and eyes.

Ingestion: Ingestion is unlikely.

AVOID SKIN CONTACT.

Respiratory Protection:	Normally not necessary. If mist generated by excessive heating, wear approved organic vapour respirator suitable for oil mist in areas with sufficient oxygen.
Protective Gloves:	For direct contact with hydrocarbons of more than 2 hours, VITON or NITRILE recommended. Otherwise, PVC gloves may be worn.
Eye Protection:	Chemical goggles if splashing likely.
Other Protective Clothing:	Long sleeved clothing to minimize skin contact.

SECTION X SPECIAL PRECAUTIONS

High standards of personal hygiene are necessary. Wash hands after handling and before eating. Avoid inhalation and skin contact. Launder work clothes frequently. Discard saturated leather goods.

SECTION XI REFERENCES

ACGIH. Threshold Limit Values and Biological Exposure Indices for 1987-88.
CONCAWE. First Aid Measures. Medical Toxicology Data and Professional Advice to Clinicians on Petroleum Products. February 1983.
API. Petroleum Process Stream Terms Included in the Chemical Substances Inventory Under the Toxic Substances Control Act (TSCA), 1983.
API. The Toxicity of Petroleum Hydrocarbons. May 1982.
API. Acute Toxicity Tests. 78-6, 78-7, 78-8, 79-2, 1980.

Petro-Canada and its affiliates assume no responsibility for injury to anyone caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Petro-Canada Inc. and its affiliates assume no responsibility for injury to anyone caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee and third persons assume the risk in their use of the material.

Petro-Canada Inc.

APPENDIX E.10

Rerefined Oil

PRODUCT APPLICATION SHEET FOR REREFINED OIL

A. GENERAL INFORMATION

DESCRIPTION

Rerefined oils are currently produced at only one location in Ontario: Safety-Kleen Canada Inc. Breslube Division in Breslau, Ontario.

Breslube's base oil is a rerefined paraffinic mineral oil, that contains no additives. It is manufactured from waste oils and has a characteristic petroleum odour. Currently it is not used as a dust suppressant due to a lack of production capacity and company policy. Rerefined oils are used as lubricants in a variety of services.

MANUFACTURER

Safety-Kleen Canada Inc.
Breslube Division
Regional Road #17
P.O. Box 130
Breslau, Ontario

Telephone: (519) 648-2291
Fax: (519) 648-2658
Contact: Mr. L.S. Schofield

APPLICATORS/CONTRACTORS

Mr. S.L. Schofield at Safety Kleen can provide information on applicators of Breslube as a road dust suppressant.

B. HANDLING PROCEDURES

PERSONAL PROTECTION

The following protective measures suggested by the manufacturer will minimize the risk of personal injury in the handling of rerefined oil.

1. Operators should wear chemical goggles if splashing of oil is likely or a high-pressure system is in use.

2. Operators should wear Neoprene or Nitrile gloves under normal use if contact is likely.

3. Operators are not required to wear respiratory protection under normal operations. Operators should wear approved organic vapour respirators suitable for oil mist in areas with sufficient oxygen if mist is generated by heating or spraying.

4. Operators should wear long sleeved clothing to minimize skin contact.

EMERGENCY FIRST AID

First aid procedures are outlined in the attached Materials Safety Data Sheet for Breslube Base Oils, 1990.

TRANSPORTATION AND SHIPPING REQUIREMENTS

No special precautions, other than those normally employed in the transportation of industrial hydrocarbon liquids are necessary.

SPILL PROCEDURES

In accordance with Part 9, Section 79 of the Environment Protection Act, a spill is defined as any discharge, intentional or unintentional, of material from its containing unit beyond the recommended maximum application rate into the natural environment.

This can be caused by spray bars left on after operation, tank rupture, tank turn over, etc. In the event of a spill the following procedures are recommended:

1. The spill should be contained using sand or earth to prevent rerefined oil from entering water ways or low areas. All sources of ignition must be removed.

2. As much as possible of the spilled oil should be recovered with pumping equipment or absorbent material.

3. The remaining spilled oil should be absorbed with sand, or diatomaceous earth or commercial solvents.

4. The following should be contacted:

    - All local municipal authorities

- The Spill Action Centre, at 1-800-268-6060.
- Environment Canada at The Ontario Regional Environmental Emergencies line: (416)-973-1059, or (416)-346-1971 (cellular).
- Breslube should be contacted at (519) 648-2291.

C. APPLICATION PROCEDURES

SITE RESTRICTIONS

According to the Ontario Ministry of Environment's Draft Guidelines for the Application of Dust Suppressants, dust suppressants should not be applied to sites closely adjacent to, or crossing, waterway(s), marshes, or wells.

SURFACE PREPARATION

Surface preparation usually consists of no more than grading to remove potholes and corrugations. However, a general preparation for the road surface to insure proper application is as follows:

1. Proper drainage should be provided on both sides of the road.

2. The surface should be graded to a significant depth (20 to 50 mm) to remove pot holes, corrugations and other ruts. If the road is deeply rutted or corrugated it may require scarification between 25 and 100 mm.

3. Gravel or fines should be added as required to yield a final composition of up to 8 percent fines (<200 mesh).

4. Rerefined oil should be applied desired levels while the surface still retains some moisture (this aids in wetting of the particle surfaces and helps prevent dust pockets from forming).

5. Compaction of the surface is suggested to provide a firm solid base, particularly if the surface is being newly constructed.

APPLICATION EQUIPMENT

Application equipment for oils is usually a bituminous distributor. The Ontario Ministry of Transportation requires that the distributor be equipped with a pump capable of developing a constant uniform pressure in the spray bar manifold. In

addition, the spray bar must be capable of application over a variety of widths. The distributor tank should also come equipped with a dip stick for measuring quantities applied.

A general equipment list for bituminous distributors also contains the following:

- Recirculation in the tank.
- A quick opening gate in the dome.
- An external readily visible tank gauge.
- Rear mounted spray bars and nozzles 0.6 to 3.6 m wide capable of:
  - vertical and lateral adjustment
  - producing double coverage in one pass.
- Spray bars that do not extend into the lane of opposing traffic unless adequate warning measures are taken.
- The feed to the spray bars equipped with:
  - recirculation before and during operation and
  - filters.
- Spray nozzles:
  - fitted with instant on/off valves, and,
  - which yield fan-shaped sprays without atomization.
- A pressure pump capable of supplying approximately 726 L/min of oil.
- An operator visible 345 MPa pressure gauge.
- An operator visible flow meter.
- An operator visible pump tachometer.

PERSONNEL REQUIREMENTS

Typically two to four people are required for safe applications. This would consists of at least one, maybe two, flag-persons and/or an operator of a warning pilot vehicle, the operator of the application truck, and an application checker (the flag person can double as a checker).

LENGTH OF TIME BEFORE AND AFTER PRECIPITATION

Application of rerefined oil should be made no sooner than 6 to 12 hours after a significant rainfall, but while the soil still retains some moisture. This will prevent dust beads from forming, and there by preventing wetting of the soil aggregate by the oil.

In addition, application should not be made within 6 hours of expected rainfall to permit complete saturation, penetration, and absorption of the oil into the road surface and to avoid leaching and runoff.

DILUTION

Rerefined is not normally diluted for application. Rerefined oils should not be mixed with anything than other virgin hydrocarbon base oils for the purpose of thinning. Strong oxidizing agents should be particularly avoided since these will react with oils.

APPLICATION FREQUENCY AMD RATE

Rerefined oils are not currently used for dust suppression. Therefore, information is not available on application rates for rerefined oils. Information is provided for virgin oil application, since these oils are believed to behave the same for dust suppression and road stabilization.

Virgin oils are usually applied once per season in Ontario at municipal road and industrial sites. Some very heavy industrial locations may apply twice per season. According to a survey of various highway agencies in Canada and the U.S. (Public Works Canada, 1983), application of oil products ranged from two light applications per year of about 0.8 to 1.7 L/m^2 to one heavy application in Alberta of about 2.5 to 3.0 L/m^2 every two to three years. Ontario industrial application rates vary from 0.3 L/m^2 to 1.9 L/m^2, and municipal application rates are from 1.1 to 1.3 L/m^2. Subsequent applications, if made, are at the same rates as initial applications.

Ponding should be avoided during application. Ponding will depend on several factors: the rate of oil discharge, the speed of the application truck, and the porosity of the surface materials. Ponding can be prevented by shutting off the spray bars when the vehicle/truck is stopped or is passing over paved/sealed portions of the road. Care should also be exercised to ensure that the oil is applied at or below the suggested rates. If ponding still occurs, then a decrease in the application rate is necessary.

CURING TIME

There is no curing time associated with rerefined oil. It remains in the viscous liquid state. Traffic can be permitted immediately following application, but 1/2 hour of slowed traffic is recommended to permit adequate penetration.

PROBLEMS AND HAZARDS

Driving over freshly applied oil may cause splashing onto cars. Heavy rains on roads with high clay content treated with oil may cause slippery conditions since the oil acts as a lubricant between clay particles.

SECTION I -- IDENTITY INFORMATION

BRESLUBE
DIVISION OF SAFETY KLEEN CANADA INC.
REGIONAL ROAD #17
P. O. BOX 130
BRESLAU, ONTARIO, CANADA
EMERGENCY PHONE NUMBERS:
519-648-2291
519-648-2204 (24 HOURS)
1-800-265-2444 (ONTARIO)
1-800-261-2792 (U.S.A.)
PRODUCT IDENTIFIER: BresLube - - 85HT - B500HT Base Oils
Family/Chemical Name: Re-refined lubricating oil; Hydrocarbon
SYNONYMS: HVI paraffinic petroleum oil
PRODUCT USAGE: A base oil which does not contain additives. Used for certain lubrication activities and as a base oil which may be blended with additives.
This Material Safety Data Sheet is prepared as a generic sheet for the family of products listed in the Identity section above.

SECTION II -- HAZARDOUS INGREDIENTS

These products are not hazardous in their normal intended usage. However if these products are to be used in applications where oil mists are generated, please refer to the section of this sheet entitled Other Information.

SECTION III -- PHYSICAL DATA

PHYSICAL STATE: Liquid
APPEARANCE AND ODOUR: Amber viscous liquid with a characteristic petroleum odour.
Odour threshold: Not determined
BOILING POINT: Wide range. Generally > 260°C (500°F)
FREEZING POINT: Not applicable
EVAPORATION RATE: Very slow at room temperature. Approx. 1000X slower than ethyl ether.
PERCENT VOLATILE: Negligible
VAPOUR DENSITY: Not determined. Heavier than air.
VAPOUR PRESSURE: At 25°C, <1 x 10^{-3} mm Hg estimate from similar product
SOLUBILITY IN WATER: At 20°C, insoluble
PH: Not determined.
SPECIFIC GRAVITY: Approx. 0.85 - 0.88 @ 15.5°C (60°F) (H_2O = 1)
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not determined.

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 171°C (340°F) minimum. Cleveland Open Cup.
FIRE POINT: Not determined; Estimated to be 10 - 20 C° (18 - 36 F°) higher than flash point.
CONDITIONS OF FLAMMABILITY: Must be heated to sustain flames.
FLAMMABLE LIMITS IN AIR - LOWER: Not determined. (1% typical for petroleum product mists)
FLAMMABLE LIMITS IN AIR - UPPER: Not determined. (10% typical for petroleum product mists)
EXTINGUISHING MEDIA: Carbon Dioxide, Foam, Dry Chemical, Water Spray. Water jets or foam may cause frothing and cause material to spread.
FIRE FIGHTING PROCEDURES -- SPECIAL: Use self-contained breathing apparatus. Keep storage tanks cool using water spray.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Decomposition and combustion products may be toxic. Heated tanks and drums may rupture, explode or be thrown into the air.
HAZARDOUS COMBUSTION PRODUCTS: Thermal decomposition and burning may produce carbon monoxide, carbon dioxide,

SECTION IV--FIRE AND EXPLOSION HAZARD DATA CONTINUED...

nitrogen oxides and other toxic organic species.
EXPLOSION DATA: Not sensitive to mechanical impact. Not sensitive to electrical discharge unless heated above flash point.

SECTION V -- REACTIVITY DATA

STABILITY: Stable
INCOMPATIBILITY: Strong oxidizing agents (e.g. chlorine, peroxides, strong acids).
HAZARDOUS POLYMERIZATION: Will not occur
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide and other asphyxiants.

SECTION VI -- HEALTH HAZARD DATA

This Material Safety Data Sheet (MSDS) has been prepared in compliance with the United States Federal OSHA Hazard Communication Standard 29 CFR 1910.1200 and the Canadian Hazardous Products Act R.S.,c. H-3;1985

PRIMARY ROUTES OF EXPOSURE: Inhalation of oil mist possible under certain conditions of use; Skin contact; Eye contact; Low order of toxicity by all routes. This material as a whole has not been tested for all potential health hazards.
EXPOSURE LIMITS:
ACGIH TLV: TWA 5 mg/m^3: STEL 10 mg/m^3 for oil mists
OSHA PEL: TWA 5 mg/m^3
LD_{50}: > 5000 mg/kg body weight in rats estimated; oral and dermal
LC_{50}: Not determined
SENSITIZATION: Not applicable.
CARCINOGENICITY: This product has been tested for dermal carcinogenicity by the Sun Predictor Test and is predicted to be dermally non-carcinogenic. This chemical is not considered to be carcinogenic by IARC, NTP or OSHA.
Note: Some lubricating oils may become carcinogenic after usage over a period of time. Observe proper personal hygiene.
SIGNS AND SYMPTOMS OF EXPOSURE:
ACUTE:
Skin: May cause slight irritation but does not cause permanent damage. May result in defatting, redness, itching, inflammation, cracking and possible secondary infection. Hot material may cause thermal burns.
Eye: May cause slight irritation but does not cause permanent damage. Contact with hot material may cause thermal burns.
Inhalation: Exposure to high oil mist concentrations may lead to oil pneumonia.
Ingestion: May cause nausea and vomiting. May act as a laxative. May irritate gastrointestinal tract. Does not cause permanent damage.
CHRONIC:
Inhalation: Exposure to high oil mist concentrations may lead to oil pneumonia.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Allergy, eczema or skin conditions.
REPRODUCTIVE TOXICITY: Not applicable.
TERATOGENICITY: Not applicable.
MUTAGENICITY: This product has been tested by the Modified Salmonella Mutagenicity Assay and is predicted to be non-mutagenic.
TOXICOLOGICALLY SYNERGISTIC PRODUCTS: Not determined.

SECTION VII -- FIRST AID MEASURES

EMERGENCY AND FIRST AID PROCEDURES -- EYES: Flush eyes with water for 15 minutes or until irritation subsides. Get medical attention if irritation persists.
EMERGENCY AND FIRST AID PROCEDURES -- SKIN: Promptly remove from skin with dry cloth followed by thorough washing with mild soap and water. Treat burns from hot oil by running under cold water. Get medical attention if burns are serious.
EMERGENCY AND FIRST AID PROCEDURES -- INGESTION: Do not induce vomiting because of danger of aspirating liquid into lungs. If conscious, give large quantities of water or milk to dilute stomach contents. Do not attempt to give anything by mouth to an unconscious person. Get medical attention.
EMERGENCY AND FIRST AID PROCEDURES -- INHALATION: Remove to fresh air. Administer artificial respiration if breathing is stopped. Get medical attention.
EMERGENCY AND FIRST AID PROCEDURES -- OTHER: Remove and wash non-impervious contaminated clothing prior to reuse.

SECTION VIII -- PREVENTIVE MEASURES

SECTION VIII (a) -- SPILL OR LEAK PROCEDURES

SPILL PROCEDURES: If possible, contain as a liquid for possible re-refining. Absorb onto sand or other absorbent material. Shovel into closeable container for disposal. Wear protective equipment specified below. Contain away from surface waters and sewers.

WASTE DISPOSAL METHODS: Dispose in accordance with Federal, State, Provincial and local regulations. Contact manufacturer regarding recycling.

SECTION VIII (b) -- SPECIAL PROTECTION INFORMATION

VENTILATION: Local exhaust recommended where oil mist concentration exceeds TLV. Mechanical exhaust acceptable.
PROTECTIVE GLOVES: Wear impervious gloves. Neoprene or nitrile rubber recommended.
EYE PROTECTION: In cases where there is likelihood of eye contact, wear splashproof goggles.
RESPIRATORY PROTECTION: None required for normal conditions. Use approved equipment when exposed to oil mist concentrations above the personal exposure limit.
OTHER PROTECTIVE EQUIPMENT: Wear gauntlets and apron, especially for transfer of bulk quantities of product.

SECTION VIII (c) -- SPECIAL PRECAUTIONS

HANDLING PRECAUTIONS: Do not get in eyes, on skin or clothing. Do not inhale mists or heated vapors. Do not taste or swallow. Use with adequate ventilation. Wait for hot oil to cool before handling.
SHIPPING AND STORING PRECAUTIONS: Empty product containers may contain product residue. Do not reuse containers. Do not pressurize, cut, heat, weld, grind or expose containers to flame or other sources of ignition. Keep container tightly closed when not in use and during transport.

SECTION VIII (C) -- SPECIAL PRECAUTIONS CONTINUED...

PERSONAL HYGIENE: Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco products.

SECTION IX -- REGULATORY INFORMATION

TDGA/DOT PROPER SHIPPING NAME: Not regulated as a hazardous material by either the U.S. Dept. of Transportation (DOT) 49 CFR 172.101 Hazardous Materials Table, or by the Canadian Dept.of Transportation's Transporation of Dangerous Goods Act.
TDGA/DOT CLASS: None.
TDGA/DOT NUMBER: None.
RCRA STATUS: Not a hazardous waste under RCRA (40 CFR 261).
TOSCA INVENTORY STATUS: Not prohibited under TOSCA regulations.
SARA Title III: Not listed.

SECTION X -- OTHER INFORMATION

In its expected use this product is not hazardous. If this material is used in applications where oil mists are produced the following information is relevant:

SPECIFIC CHEMICAL NAME: Spent Lube Oil, Hydrotreated..C15-C50
PERCENT: 100%
CAS REGISTRY: #64742-58-1
HAZARD: ACGIH TLV / OSHA PEL - Oil Mist
EXPOSURE LIMITS:
OSHA PEL: TWA 5 mg/m^3 for oil mists.
ACGIH TLV: TWA 5 mg/m^3: STEL 10 mg/m^3 for oil mists .

SECTION XI -- PREPARATION INFORMATION

PREPARED BY: BresLube WHMIS Group
ISSUE DATE: September 29, 1988
REVISED: JANUARY 29 1990

Certificate of Analysis

SAFETY-KLEEN CANADA INC.
BRESLUBE DIVISION
300 WOOLWICH ROAD
BRESLAU, ON
27 Mar 1991

Our order #00104817-000 for DIANE MCCURDY, CH2M HILL ENG
Our cust. #019902-04E SUITE 100 PLAZA 3
2000 ARGENTIA ROAD
Mail to: SAME [illegible]

Product Identified : [illegible]

Results from Certificate Sample

Trailer ID: Loading. Ref. #OR-55426

Viscosity @ 100 F SUS	55.6 SUS
Viscosity Index	97
Viscosity @ 100 C	3.44 cSt
Viscosity @ 40 C	15.77 cSt
Colour Index	L1.5
Specific Gravity @ 60 F	0.8649 sp.gr.@6
Pour Point	-15 deg. C
Total Acid Number (mg KOH /g)	0.024 mg/g
Flash Point by Clevland Open Cup	190 deg. C
Demulsibility @ 54C Oil Phase	41 ml
Demulsibility @ 54C Water Phase	39 ml
Demulsibility Emulsion Phase	0 ml
Demulsibility @ 54C Time in minutes	5 min

Authorized Signature

Certificate of Analysis

SAFETY-KLEEN CANADA INC.
BRESLUBE DIVISION
300 WOOLWICH ROAD
BRESLAU, ON
27 Mar 1991

Our order #00104620-000 for DIANE MCCURDY, CH2M HILL ENG..
Our cust. #0199DI-04E SUITE 100 PLAZA 3
2000 ARGENTIA ROAD
[illegible] MISSISSAUGA ON

Product Identified DOMINION BRESLUBE 100 A

Results from Certified Customer Samples

Trailer Oil Reading, Ref. #90-55151

Viscosity @ 100 F SUS	105.5 SUS
Viscosity Index	89
Viscosity @ 100 C	3.97 cSt
Viscosity @ 40 C	19.95 cSt
Colour Index	L2
Specific Gravity @ 60 F	0.8676 sp.gr.@6
Pour Point	-12 deg. C
Total Acid Number (mg KOH /g)	0.01 mg/g
Flash Point by Clevland Open Cup	200 deg. C
Demulsibility @ 54C Oil Phase	43 ml
Demulsibility @ 54C Water Phase	37 ml
Demulsibility Emulsion Phase	0 ml
Demulsibility @ 54C Time in minutes	5 min

Authorized Signature Robin Angel